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Environmental Assessment

California Space Center

Vandenberg Air Force Base
California

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14. ABSTRACT

This Final Draft EA addresses the proposed construction and operation of the California Space Center (CSC) by the California Space Authority (CSA) and California Space Education and Workforce Institute on Vandenberg Air Force Base (VAFB), at the former Lake Canyon Trailer Park No. 7 site. This site is a 71-acre parcel located at the intersection of Highway 1 and Azalea Lane on VAFB. The CSA?s purpose for the Center is to inspire students to study space-related curricula by providing viewings of actual rocket launches and interactive, hands-on educational space exhibits. The CSA also intends for the CSC to educate the public about California space enterprise, its history, and current mission in particular. One key feature of the CSC would be a launch viewing facility that would offer students and the public a direct line of sight to Space Launch Complexes on south VAFB. The CSA would construct the CSC in phases over 9 years, starting in mid-2010. The first day of operation is planned for mid-2012.

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FINDING OF NO SIGNIFICANT IMPACT

AND FINDING OF NO PRACTICABLE ALTERNATIVE

California Space Center

at Vandenberg Air Force Base, California

Pursuant to provisions of the National Environmental Policy Act (NEPA), 42 U.S. Code 4321 et seq., implementing Council on Environmental Quality (CEQ) regulations, 40 Code of Federal Regulations (CFR) 1500-1508, and 32 CFR Part 989, *Environmental Impact Analysis Process*, the United States Air Force and the California Space Authority (CSA) conducted an assessment of the potential environmental consequences associated with the construction and operation of the California Space Center (CSC or Center) on Vandenberg Air Force Base (VAFB or Base), California.

The Environmental Assessment (EA), incorporated by reference to this finding, considers all potential environmental impacts of the Proposed Action and the No-Action Alternative. The EA also considers these impacts cumulatively, in conjunction with other agency projects near and at VAFB. The EA analyzes the potential environmental consequences of activities associated with the proposed construction and operation of the CSC, and provides guidelines to avoid adverse environmental effects.

PROPOSED ACTION

The proposed project would establish the Center on VAFB, at the former Lake Canyon Trailer Park No. 7 site, a 71-acre parcel located at the intersection of Highway 1 and Azalea Lane. This site is outside of Base entry control. The purpose of the Center is to inspire students to study space-related curricula by providing viewings of actual rocket launches and interactive, hands-on educational space exhibits. The Center is also intended to educate the public about the California space enterprise, its history and current mission in particular. One of the key features of the CSC would be a launch viewing facility that would offer students and the public a direct line of sight to Space Launch Complexes on south Base. Additionally, the launch viewing facility would provide comfortable and convenient seating, and a safe viewing area for any VAFB launch.

The Center would be constructed in phases over a 9-year period starting in mid-2010, with the first day of operation planned for mid-2012. Over this 9-year period, the local economy would experience an average economic boost of $35.4 million per year from the construction of the CSC alone. The Mission Support Complex is anticipated to be utilized by engineers and scientists, technicians, supervisors and managers, production workers, professional support, and administrative assistants. At full occupancy with this workforce, the economic impact of the Mission Support Complex is estimated at $280 million. The total economic impact of the complex between its inception and the year 2020 would be almost $1.7 billion. It is anticipated that when fully operational, the Center could host between 200,000 and 500,000 visitors annually.

NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the CSC would not be constructed or operated. The CSC site under the Proposed Action would continue to exist as an abandoned trailer park. While this alternative would result in no effect to the existing environment, it would also eliminate the benefits of the CSC. These benefits include educational opportunities for students and adults, and the additional safe viewing

area for VAFB launches. The No-Action Alternative would also diminish the economic outlook for the northern Santa Barbara County area.

SUMMARY OF FINDINGS

The analyses of the affected environment and environmental consequences of implementing the Proposed Action, as presented in the EA, concluded that with implementation of the environmental protection and monitoring measures described in Chapter 4, no significant impact or adverse effects should result to Cultural Resources (Section 4.3), Earth Resources (Section 4.4), Hazardous Materials and Waste Management (Section 4.5), Human Health and Safety (Section 4.6), Land Use and Aesthetics (Section 4.7), Solid Waste (Section 4.9), Transportation (Section 4.10), and Water Resources (Section 4.11). In addition, the EA concluded that the Proposed Action would not affect Environmental Justice, and would result in beneficial effects to Socioeconomics (Section 4.8).

No cumulative significant or adverse impacts should result from activities associated with the construction and operation of the CSC, when considered in conjunction with past, present, or reasonably foreseeable future agency projects near and on VAFB (Section 4.12).

Two areas of environmental consequences, Air Quality and Biological Resources, evaluated in the EA were determined to have the potential to result in less than significant impacts to the environment.

Air Quality

Fugitive dust emissions generated from equipment operating on exposed ground and combustive emissions from the equipment would cause adverse air quality impacts. However, no significant impacts are anticipated (see EA Sections 3.1 and 4.1). Emissions from the Proposed Action would not exceed significance thresholds; therefore, no adverse impacts to the region's air quality would occur. All measures described in the EA would be implemented to further decrease emissions during project activities.

Biological Resources

The proposed construction of the CSC has the potential to result in short-term temporary adverse effects to biological resources in the immediate area of disturbance, and long-term adverse effects on some resources within the project site. Compliance with the Migratory Bird Treaty Act would be accomplished through pre-construction surveys and protection of active nests as described in Section 4.2 of the EA. The United States Fish and Wildlife Service issued a Biological Opinion (8-8-10-F-15) that concluded that the Proposed Action would not jeopardize the continued existence of the El Segundo blue butterfly, the California red-legged frog, or the vernal pool fairy shrimp, all federally-protected threatened or endangered species. The CSA shall fund, implement, and comply with all protective measures and terms and conditions included in the Biological Opinion to compensate for adverse effects on those species.

Branchinecta sp. cysts, likely *B. lynchi* (federally endangered), were identified within three vernal pools (0.07 acre) in the proposed project area. Two of these pools (0.02 acre) are within the construction area and would be lost due to construction, while one pool (0.03 acre) would be preserved. Any habitat lost would be re-created at a site outside the project area conducive to its successful establishment, thus resulting in no net loss of habitat on VAFB.

A total of 298 seacliff buckwheat plants (host plant to the federally endangered El Segundo blue butterfly [*Euphilotes battoides allyni*]) were identified within a 0.05-acre section of the proposed project area. Although these plants cannot be fully excluded as potential habitat for the butterflies, the small amount of habitat, its isolation, the extensive distribution of seacliff buckwheat on VAFB, and the fact

that El Segundo blue butterflies have not been documented within known dispersal distance of the proposed project area, indicate the loss of habitat within the site is unlikely to adversely affect VAFB populations of the butterfly. Any buckwheat plants lost due to construction would be replaced at a pre-designated restoration site at a 1:10 ratio.

It is unlikely that the federally threatened California red-legged frog (*Rana draytonii*) occupies the site on a regular basis because water is only present intermittently at the wetlands (1.34 acres) within the proposed project area. There is also a lack of heavy vegetative cover within the site. The installation of retention basins at the proposed CSC site has the potential to attract frogs. Depending on annual rainfall levels, these ponds may constitute suitable breeding habitat for this species. Environmental protection and minimization measures as described in Section 4.2 of the EA would be implemented to minimize the potential for their establishment and adverse effects; VAFB populations would not be adversely affected by the Proposed Action.

Based on the wetlands delineation and the disturbance footprint for the proposed project, it is anticipated that 1.34 acres of wetland habitat would be subject to disturbances from construction activities in the vicinity (i.e., dust from equipment, loss due to construction). Of these 1.34 acres, the 0.5 acre of riparian forest qualifying as a jurisdictional wetland would be avoided, and 0.38 acre of wetlands (vernal marsh) within the construction area would be preserved. Wetlands lost due to construction would be re-created in a pre-designated area outside of the proposed project site to ensure no net loss of wetlands occurs. A Clean Water Act (CWA) Section 401 Water Quality Certification from the Central Coast Regional Water Quality Control Board and CWA Section 404 Permit from the U.S. Army Corps of Engineers would be required because direct impacts to water bodies or wetlands would occur. Compliance with the conditions of the Section 401 and 404 permits would ensure adverse effects are minimized. With these measures in place, impacts would be less than significant.

PRACTICABLE ALTERNATIVES

The Proposed Action would occur within an area that contains wetlands and result in disturbance to 0.46 acre of wetlands. No other alternatives were identified that would meet the criteria to fulfill the purpose and need for the proposed project without incurring significant costs by the Air Force to prepare a site for development and use by a non-Air Force proponent. Therefore, no practicable alternative to the Proposed Action is possible.

FINDING OF NO PRACTICABLE ALTERNATIVE

Pursuant to Executive Order 11990 and 32 CFR 989.14(g), the authority delegated in SAFO 791.1, and taking the information contained in the attached EA into consideration, I find that there is no practicable alternative to implementing the Proposed Action in wetlands. The Proposed Action, as designed, includes all practicable measures to minimize harm. Before undertaking this action, VAFB officials and CSA will complete all relevant regulatory processes, and, subsequently, abide by all permit conditions and mitigations.

FINDING OF NO SIGNIFICANT IMPACT

Based upon my review of the facts and analyses contained in the attached EA, conducted in accordance with the provisions of NEPA, the CEQ regulations, and 32 CFR Part 989, I conclude that the Proposed Action should not have a significant environmental impact, either by itself or cumulatively with other projects at VAFB or within the region of influence. Accordingly, an Environmental Impact Statement is not required. The signing of this Finding of No Significant Impact and Finding of No Practicable Alternative completes the environmental impact analysis process.

FINDING OF NO SIGNIFICANT IMPACT and
FINDING OF NO PRACTICABLE ALTERNATIVE
CONCURRENCE PAGE

In Conjunction with Final Environmental Assessment for the California Space Center at Vandenberg Air Force Base, California

MAJCOM Approval:

_____ _____

CHRIS PUCKETT
SES, DAF
Director of Logistics, Installations
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Date

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Environmental Assessment

California Space Center

Vandenberg Air Force Base
California

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8 April 2010

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Acronyms and Abbreviations

%	Percent
ºF	Degrees Fahrenheit
µg/m^3	Micrograms per cubic meter
30 CES/CEA	30th Civil Engineer Squadron Asset Management Flight
30 CES/CEANC	30th Civil Engineer Squadron Asset Management Flight, Environmental Conservation
30 CES/CEANP	30th Civil Engineer Squadron Asset Management Flight, Pollution Prevention and Sustainment
30 CES/CEANQ	30th Civil Engineer Squadron Asset Management Flight, Environmental Quality
30 CES/CEAO	30th Civil Engineer Squadron Asset Management Flight, Asset Optimization
30 SW	30th Space Wing
ADT	Average daily traffic
Air Force	United States Air Force
AOC	Area of Concern
AOI	Area of Interest
ATE	Associated Transportation Engineers
Base	Vandenberg Air Force Base
BCC	Federal Bird of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practice
C&D	Construction and demolition
Caltrans	California Department of Transportation
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
Center	California Space Center
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CH_4	Methane
CHP	California Highway Patrol
CIWMB	California Integrated Waste Management Board
CMP	Congestion Management Plan
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
CSA	California Space Authority
CSC	California Space Center
CSML	City of Santa Maria landfill
CSWEI	California Space Workforce and Education Institute
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted decibel

EA	Environmental Assessment
EDD	Employment Development Department
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
ESA	Endangered Species Act
FE	Federal Endangered Species
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
ft	Feet
FR	Federal Register
FT	Federal Threatened Species
GHG	Greenhouse gases
GIS	Geographic Information System
GPS	Global Positioning System
GWP	Global warming potential
H_2S	Hydrogen sulfide
HFC	Hydrofluorocarbon
Hwy	Highway
ID	Identification
IRP	Installation Restoration Program
IPA	Isopropyl alcohol
ITE	Institute of Transportation Engineers
kW	Kilowatt
kVA	Kilovolt amperes
LEA	Local enforcement agency
LEED	Leadership in Energy and Environmental Design
LED	Light emitting diode
L_{eq1H}	One-hour average sound level
LOS	Level of Service
m	Meter
MEK	Methyl ethyl ketone
mg/m^3	Milligrams per cubic meter
MMBTU	One thousand thousand British Thermal Units
MMRP	Military Munitions Response Program
mph	Miles per hour
MSRS	ManTech SRS Technologies, Inc.
MW	Megawatt
N/A	Not applicable
NAAQS	National Ambient Air Quality Standards
NCA	Noise Control Act
NEPA	National Environmental Policy Act
N_2O	Nitrous oxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NOAA Fisheries Service	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NSR	New source review
O_3	Ozone

O&M	Operations and maintenance
OSHA	Occupational Safety and Health Administration
P2	Pollution prevention
Pb	Lead
PFC	Perfluorocarbon
PG&E	Pacific Gas & Electric
$PM_{2.5}$	Particulate matter 2.5 microns or less in diameter
PM_{10}	Particulate matter 10 microns or less in diameter
POL	Petroleum, oil, and lubricant
PPA	Pollution Prevention Act
ppm	Parts per million
RCRA	Resource Conservation and Recovery Act
ROG	Reactive organic gas
ROI	Region of influence
RWQCB	Regional Water Quality Control Board
SAIC	Science Applications International Corporation
SBCAPCD	Santa Barbara County Air Pollution Control District
SCAQMD	South Coast Air Quality Management District
SCCAB	South Central Coast Air Basin
SF_6	Sulfur hexafluoride
SHPO	State Historic Preservation Officer
SIP	State implementation plan
SLC	Space launch complex
SO_x	Sulfur oxides
SO_2	Sulfur dioxide
SO_4	Sulfates
SR	State Route
SRS	SRS Technologies, Inc.
SSC	California species of special concern
SWFP	Solid waste facility permit
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
UCSB	University of California Santa Barbara
U.S.	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
UST	Underground storage tank
UXO	Unexploded ordnance
VAFB	Vandenberg Air Force Base
(V/C)	Volume to roadway capacity
VIP	Very important person
VOC	Volatile organic compound
WWRP	Wastewater Reclamation Plant

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Chapter 1. Purpose of and Need for the Proposed Action

The California Space Authority (CSA), together with the California Space Workforce and Education Institute (CSWEI), is proposing to establish the California Space Center (CSC or Center) on California's Central Coast, at Vandenberg Air Force Base (Figure 1-1). The CSC would include a Visitor Center, a Youth Education Center, an Adult Education and Conference Center, a Mission Support Complex, and a support facility (referred to as the Back of House in this Environmental Assessment). The Center would be constructed in phases over a 9-year period, starting in mid-2010, with the first day of operation planned for mid-2012.

This Environmental Assessment (EA) evaluates the potential environmental consequences of constructing and operating the CSC on Vandenberg Air Force Base (VAFB or Base), California. The National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations require lead agencies to evaluate the potential impacts of federal actions on the human environment. The United States (U.S.) Air Force (Air Force or USAF) is the lead agency for NEPA compliance on the proposed project.

This EA has been prepared in accordance with the NEPA of 1969, as amended (42 U.S. Code [U.S.C.] 4321 et seq.); as implemented by CEQ regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); and 32 CFR Part 989.

1.1 Background

Governed by a statewide board of directors, the CSA is a statewide, nonprofit corporation representing the interests of California's commercial, civil, and national security space enterprise. Working closely with the State of California, CSA partners with industry, government, workforce and economic development entities, education, and academia to facilitate statewide space enterprise development. Broadly defined, "space enterprise" refers to "activities that involve sub-orbital, orbital, lunar, planetary or deep space systems, operations, or related services, including supporting activities such as technology development; manufacturing; operation of ground systems, ranges and test sites; space-related education and training; and governmental support" (CSA 2009a). The mission of the CSA is to provide California space enterprise with a voice, visibility, and a competitive edge.

A sister organization to the CSA, the CSEWI, is a nonprofit corporation that was formed to: (1) create understanding, enthusiasm, and appreciation for space enterprise and space technology; (2) inspire parents, educators, and students to engage in California-based space-related education and enrichment activities; and (3) stimulate greater awareness and understanding of the California space enterprise workforce and research needs throughout academia. The CSEWI mission is to attract, integrate, and retain a robust California space workforce by: fostering California space/science literacy; enhancing California space-related education; and ensuring a 21st century California space workforce (Productive Impact LLC 2009).

1.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to construct and operate the CSC, a center to: (1) inspire students to study science, technology, engineering, and mathematics through viewings of actual rocket launches

Figure 1-1. Regional location of VAFB.

and with interactive, hands-on educational space exhibits that engage their interests; and (2) educate the public about the California space enterprise, its history and current mission in particular.

Space enterprise in California is a $31 billion business, representing 21 percent of the global space enterprise market (ATKearney 2009). This business provides over 370,000 jobs (ATKearney 2009), with the average industry salary being over $55,000 (CSA 2009a). California space enterprise touches every part of the State and has a total economic impact of over $76 billion (ATKearney 2009). The U.S. Government has noted a real shortage of future engineers and scientists in the nation (Productive Impact LLC 2009). According to Boeing Space Systems, 50 percent of their work force are of the Baby Boom generation and are expecting to retire in the next 10 to 15 years (Productive Impact LLC 2009). U.S. universities are not producing enough engineers and scientists to fill that gap (Productive Impact LLC 2009). To keep this business robust, there is a continuing need to attract new talent to the workforce, which can best be accomplished through education and hands-on experience at an early age. By educating the public, particularly students, about the past achievements of space enterprise, the CSA would encourage the next generation to consider becoming part of its future. The educational facilities and programs planned for the CSC would fulfill the need of inspiring early age school children to study science and engineering as well as the need for post-secondary education programs, including suitable classrooms and laboratory space to support classes (Productive Impact LLC 2008).

The proposed CSC launch viewing facilities would offer students and the public a venue that inspires via its direct line of sight to Space Launch Complexes (SLCs) 3 and 4, and provide comfortable and convenient seating and facilities to view any VAFB launch. This would allow the public to enjoy an up-close and personal rocket launch experience, but more importantly, it would decrease safety hazards associated with public viewing at public locations, such as along Highway (Hwy) 1 or the Harris Grade Road. In addition, the Center's launch viewing facilities would provide an additional designated public launch viewing site, improving overall safety by encouraging the public to use one location. Access to the viewing facilities during launches would be free to the public.

The proposed CSC Conference Center would be the first large conference center within a 50-mile radius. It would fill the need for a venue for companies and organizations requiring an auditorium, banquet and/or meeting facilities, and exhibit space. The conference center would be available for use by government and industry personnel on VAFB, as well as the general public (Productive Impact LLC 2009).

Lastly, the proposed CSC Mission Support Complex would provide additional office and research facilities for contractors and organizations associated with VAFB space activities. On-Base office space available to contractors is limited. Also, on-Base government facilities can only be leased to private firms for activities directly related to their involvement in the space program; thus, contractors are barred from having administrative personnel such as Human Resources, Accounting, and Contracting, resulting in inefficiencies (Productive Impact LLC 2008). Space in the proposed CSC Mission Support Complex could accommodate several hundred engineering and managerial personnel who would otherwise have to work somewhere else, likely further away, increasing cost and reducing productivity (Productive Impact LLC 2008). The CSC would also provide office and manufacturing space for organizations that want to maintain a presence at VAFB but do not need on-Base access on a daily basis.

1.3 Project Location

VAFB is headquarters for the 30th Space Wing (30 SW). The Air Force's primary missions at VAFB are to launch and track satellites in space, to test and evaluate America's intercontinental ballistic missile systems, and support aircraft operations in the Western Range. As a non-military facet of operations, VAFB is also committed to promoting commercial space launch ventures.

VAFB is located on the south-central coast of California, approximately halfway between San Diego and San Francisco (Figure 1-1 inset). The Base covers approximately 99,000 acres in western Santa Barbara County (VAFB 2007), and occurs in a transitional ecological region that includes the northern and southern distributional limits for many plant and animal species.

The project area, or site, under the Proposed Action is located at the intersection of Hwy 1 and Azalea Lane, approximately 1.4 miles south of the VAFB Main Gate, also known as the Santa Maria Gate. The site, approximately 71 acres, was previously used as a mobile home trailer park for military personnel and was known as the Lake Canyon Trailer Park No. 7. Figure 1-2 provides a regional context for the Proposed Action project area.

The site is within the VAFB property line, but outside of its entry controlled area. While the large majority of VAFB property is within the entry controlled area, and requires Air Force or VAFB badging or identification to access, the site is situated in the non-entry controlled area of VAFB; therefore, special identification or badging would not be required to access it. For purposes of this EA, the term "on-Base" refers to areas of VAFB that are entry controlled. Areas that are within the VAFB property line but are not entry controlled will be referred to as "outside of Base entry control".

1.4 Scope of the Environmental Assessment

Consistent with Title 32 CFR Part 989, and CEQ regulations (40 CFR 1500-1508), the scope of analysis presented in this EA is defined by the potential range of environmental impacts resulting from implementing the Proposed Action and alternatives. Pursuant to 40 CFR Part 1501.4(c), resources potentially impacted are considered in more detail to provide sufficient evidence and analysis to determine whether or not to prepare an environmental impact statement. This EA identifies, describes, and evaluates the potential environmental impacts that could result from the Proposed Action and the No-Action Alternative. No other feasible alternatives were identified that would meet the purpose and need for the proposed project.

This EA also considers and evaluates possible cumulative impacts from other past, present, and reasonably foreseeable future actions. In addition, the EA identifies environmental permits relevant to the Proposed Action. As appropriate, the EA describes in terms of a regional overview or a site-specific description, the affected environment and environmental consequences of the alternatives, and identifies measures to prevent or minimize environmental impacts.

Executive Order (EO) 11990, *Protection of Wetlands,* prevents the Air Force from approving projects if there are "practicable" or reasonable alternatives to impacting wetlands. Because the Proposed Action would occur within an area that contains small wetlands, and the No-Action Alternative did not meet the purpose and need for the proposed project, per 32 CFR Part 989 and EO 11990, a Finding of No Significant Impact/Finding of No Practicable Alternative (FONSI/FONPA) must be prepared.

Resources analyzed in this EA include air quality, biological resources, cultural resources, earth resources, hazardous

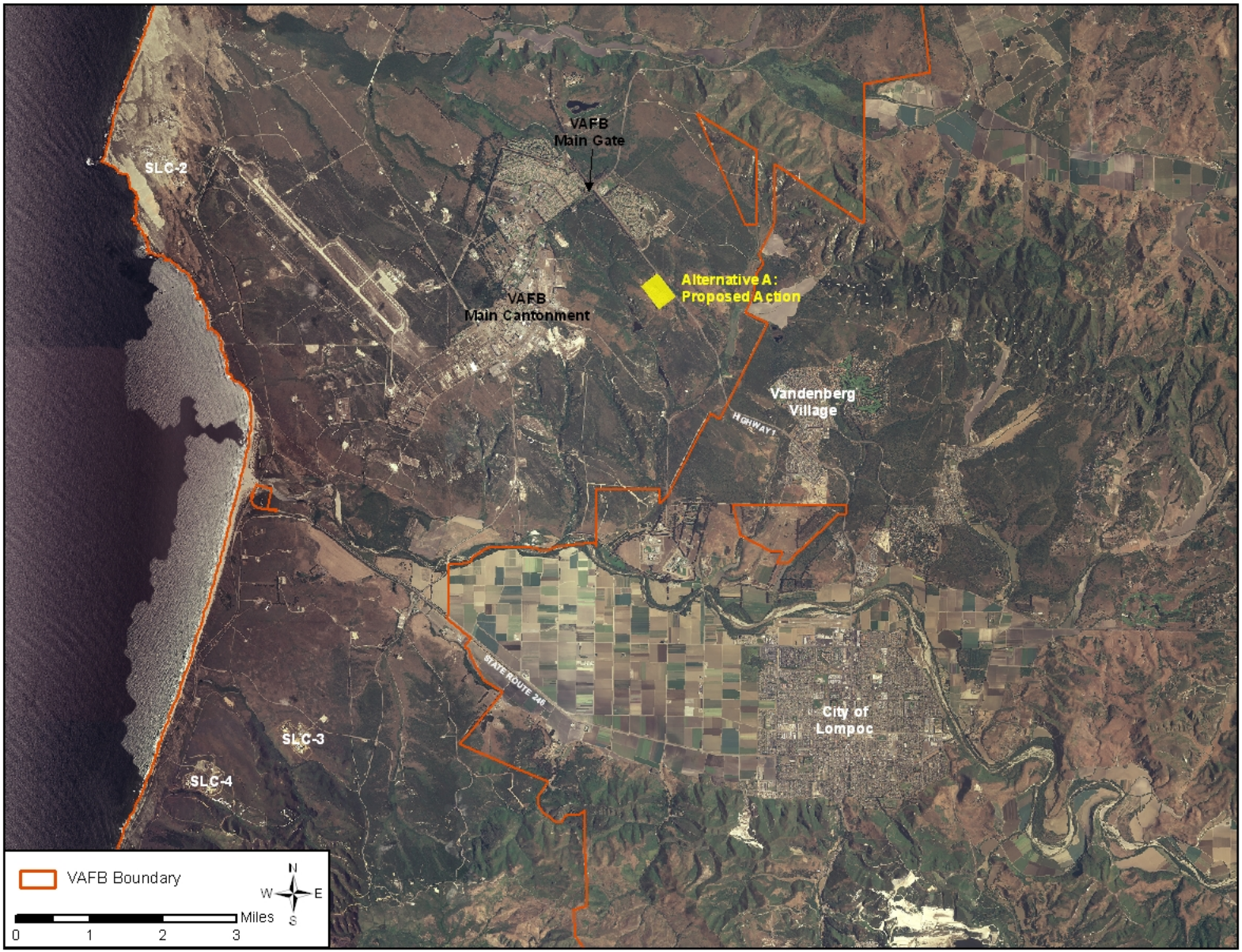

Figure 1-2. Proposed Action project area, in relation to regional landmarks.

materials and hazardous waste management, human health and safety, land use and aesthetics, socioeconomics, solid waste management, transportation, and water resources.

Per EO 12898, *Environmental Justice*, the potential effects of the Proposed Action on minority communities and low-income communities were considered. The Proposed Action would not affect low-income or minority populations within the region (Lompoc and Santa Maria Valleys). Therefore, Environmental Justice is not analyzed in this EA.

A list of acronyms and abbreviations used in this EA is included after the Table of Contents.

1.5 Applicable Regulatory Requirements

Federal and state regulations applicable to the Proposed Action and alternatives are summarized in Table 1-1.

Table 1-1. Federal and state regulations applicable to the implementation of the Proposed Action and alternatives.

Federal Regulation	Activity or Requirement
American Indian Religious Freedom Act of 1978 (42 U.S.C 1996)	The American Indian Religious Freedom Act states that the policies and procedures of federal agencies must comply with the constitutional clause prohibiting abridgment of religious freedom—including freedom of belief, expression, and exercise—for Native Americans. The American Indian Religious Freedom Act policy is to consider Native American access to sites, use and possession of sacred objects, and freedom to worship, and directs federal agencies to revise policies and procedures to correct conflicts with Native American religious cultural rights and practices.
Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469a et seq.)	The Archaeological and Historic Preservation Act is directed toward the preservation of historic and archaeological data that would otherwise be lost as a result of federal construction or other federally licensed or assisted activities. The Archaeological and Historic Preservation Act authorizes the Department of the Interior to undertake recovery, protection, and preservation of archaeological or historic data.
Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa-mm), Supplemental Regulations of 1984	The Archaeological Resources Protection Act: secures protection of archaeological resources and sites on public and Indian lands; requires permitting for any excavation or collection of archaeological material from these lands; and provides civil and criminal penalties for violations.
Clean Air Act of 1970 (42 U.S.C. 7401 et seq.)	The Clean Air Act states that applicable national ambient air quality standards must be maintained during the operation of any emission source. National Ambient Air Quality Standards include primary and secondary standards for various pollutants. The primary standards are mandated by the Clean Air Act to protect public health, while the secondary standards are intended to protect the public welfare from adverse impacts of pollution, such as visibility impairment.
Clean Air Act Amendments of 1990	These amendments establish new federal non-attainment classifications, new emissions control requirements, and new compliance dates for areas in non-attainment. The requirements and compliance dates are based on the non-attainment classification.
Clean Water Act of 1977 as amended (33 U.S.C. 1251 et seq.)	Prohibits the discharge of pollutants from a point source into navigable Waters of the U.S., except in compliance with a National Pollutant Discharge Elimination System (40 CFR Part 122) permit. Navigable Waters of the U.S. are considered to encompass any body of water whose use, degradation, or destruction will affect interstate or foreign commerce. Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. Activities in waters of the U.S. that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. Section 401 of the Clean Water Act requires that the discharge of dredged or fill material into water of the U.S. does not violate state water quality standards. Generally, no Clean Water Act Section 404 permits will be issued until the State has been notified and the applicant has obtained a certification of state water quality standards.

Federal Regulation	Activity or Requirement
Endangered Species Act of 1973 (7 U.S.C. 136; 16 U.S.C. 460 et seq.)	Declares the intention of Congress to conserve threatened and endangered species and the ecosystems on which these species depend. The Endangered Species Act requires that federal agencies, in consultation with the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration National Marine Fisheries Service, use their authorities in furtherance of its purposes by carrying out programs for the conservation of endangered or threatened species.
Energy Policy Act of 1992 as amended (42 U.S.C. 8256 et seq.)	The Energy Policy Act requires that federal agencies significantly reduce their use of energy and reduce environmental impacts by promoting the use of energy-efficient and renewable energy technologies.
Migratory Bird Treaty Act of 1918 as amended (16 U.S.C. 703-712)	The Migratory Bird Treaty Act implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful.
National Environmental Policy Act of 1969 as amended (42 U.S.C. 4321-4347)	Requires federal agencies to analyze the potential environmental impacts of major federal actions and alternatives and to use these analyses as a decision-making tool on whether and how to proceed.
National Historic Preservation Act of 1966 as amended (16 U.S.C. 470 et seq.)	The National Historic Preservation Act is the key federal law establishing the foundation and framework for historic preservation in the U.S. The Act authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places; establishes an Advisory Council on Historic Preservation as an independent federal entity; requires federal agencies to take into account the effects of their undertakings on historic properties, and to afford the Council an opportunity to comment upon any undertaking that may affect properties listed, or eligible for listing, in the Register; and makes the heads of all federal agencies responsible for the preservation of historic properties owned or controlled by them.
Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001-3013)	The Native American Graves Protection and Repatriation Act restores certain rights to Native Americans with respect to the disposition of ancestral human remains and cultural objects; vests ownership of these materials (from federal or tribal lands) with designated Native American groups; requires notification of federal agency head when Native American cultural items are discovered on federal or tribal lands; prohibits trafficking in Native American human remains and cultural items; requires inventory and tribal notification of human remains and associated funerary objects held in existing collections by museums or federal agencies; and provides for repatriation of these materials.
Noise Control Act of 1972 (42 U.S.C. 4901 et seq.)	The Noise Control Act establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. To accomplish this, the Act establishes a means for the coordination of federal research and activities in noise control, authorizes the establishment of federal noise emissions standards for products distributed in commerce, and provides information to the public respecting the noise emission and noise reduction characteristics of such products. The Act authorizes and directs that federal agencies, to the fullest extent consistent with their authority under federal laws administered by them, carry out the programs within their control in such a manner as to further the policy declared in 42 U.S.C. 4901. Each department, agency, or instrumentality of the executive, legislative and judicial branches of the Federal Government having jurisdiction over any property or facility or engaged in any activity resulting, or which may result in, the emission of noise shall comply with federal, state, interstate, and local requirements respecting control and abatement of environmental noise.
Occupational Safety and Health Act of 1970 (29 U.S.C. 659-678)	The Occupational Safety and Health Act was established to assure safe and healthful working conditions for working men and women by: authorizing enforcement of the standards developed under the Act; by assisting and encouraging the states in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health; and for other purposes.
Pollution Prevention Act of 1990	The Pollution Prevention Act establishes that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and that disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.
Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901 et seq.)	The Resource Conservation and Recovery Act gives the U.S. Environmental Protection Agency the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. The Act also sets forth a framework for the management of non-hazardous wastes.

State Regulation	Activity or Requirement
Clean Air Act of 1988 (California Health and Safety Code, Uncodified Provisions, Legislative Findings)	The Clean Air Act develops and implements a program to attain the California Ambient Air Quality Standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter less than or equal to 10 microns in diameter, lead, sulfates, hydrogen sulfide, and vinyl chloride. 40 CFR Part 51 gives state and local agencies the authority to establish air quality rules and regulations. Rules adopted by the local air pollution control districts and accepted by the Air Resources Board are included in the State Implementation Plan. When approved by the U.S. Environmental Protection Agency, these rules become federally enforceable.
Porter-Cologne Water Quality Control Act (California Water Code 13000)	Protects all waters of the State for the use and enjoyment of the people of California and declares that the protection of water resources be administered by the regional water quality control boards.
California Integrated Waste Management Act of 1989 (California Assembly Bill 939)	Provides for the proper management and disposal of solid wastes, to include the diversion requirements for construction and demolition debris.
California Global Warming Solutions Act of 2006 (California Health and Safety Code 38500)	Requires that by 2020 the State's greenhouse gas emissions be reduced to 1990 levels, a roughly 25% reduction under business as usual estimates. The California Air Resources Board, under the California Environmental Protection Agency, is to prepare plans to achieve the objectives stated in the Act. As defined in the bill, “greenhouse gases” include all of the following gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. These are the same gases listed as Greenhouse Gases in the Kyoto Protocol.

Chapter 2. Description of the Proposed Action and Alternatives

This chapter provides descriptions of each of the components of the CSC, as well as the operational parameters of the Center. It describes equipment needs and construction requirements. The chapter then compares the Proposed Action and the No-Action Alternative.

2.1 Components of the CSC

The CSC would be comprised of the following five major components.

- Visitor Center
- Youth Education Center
- Adult Education and Conference Center
- Mission Support Complex
- Back of House

Each of the major components is described below. Each component, with the exception of the Back of House, would be comprised of multiple buildings. A proposed site layout of these components is depicted in the Conceptual Master Plan (Westberg and White 2009) in Appendix A (see Site Context).

Visitor Center

The Visitor Center would be the primary focus of the CSC. The mission, activities, and exhibits at the CSC Visitor Center would be similar to the Visitor Complex at Kennedy Space Center, which includes launch pad viewing, educational and technology exhibits, digital theaters, and a retail store.

The Visitor Center would provide opportunities for the public to view and be inspired by rocket launches, with a direct line of sight to SLCs 3 and 4, and a clear view of all other launches from VAFB. An amphitheater would include a large format display screen to allow visitors to see details of launches. The Visitor Center facilities may also be used for entertainment activities such as live performances, films, and public exhibitions. The amphitheater would combine fixed seating and a viewing lawn for informal seating, to accommodate different types of activities. Access to the viewing facilities during launches would be free to the public.

Also housed within the Visitor Center would be:

- The **Interpretive Center**, which would highlight the past, present, and future of the California space enterprise, and emphasize contributions by key space organizations
- The **Heritage Exhibition Center**, which would showcase California space enterprise history, and display memorabilia from private collectors and industry that demonstrates the evolution of missile and space flight from its inception to the present
- The **Native American Cultural Center**, which would recognize and celebrate local Native American history and presence on VAFB, and provide displays that portray the Native American culture and its significance in the region

Other attractions at the Visitor Center would include a rocket park (paths around vertically mounted rockets and missiles), displays of space technology artifacts (various equipment), interactive displays designed to teach visitors about the science of space exploration, and simulation exhibits. A Native Plant Garden would be used to educate visitors on local flora and spotlight local environmental stewardship.

The Visitor Center may also include a welcome center (where guests would be met and greeted), a central plaza, a restaurant and food court, a gift shop, and a departure point for public tours of the CSC and the region.

Youth Education Center

The Youth Education Center would include education, service, and administration facilities. Instructional facilities would include lecture halls, classrooms, laboratories, hands-on interactive science displays, conference rooms, exhibit spaces, and outdoor gathering areas. The Youth Education Center would include a youth education day camp, which would focus on space and applied science. Although many aspects of the Youth Education Center would appeal to youth of all ages, specific programs would be developed to accommodate children in the fifth grade to tie into the California school curriculum for space science education. It is anticipated that youth and school groups from Lompoc and Santa Maria Valley, as well as other San Luis Obispo and Santa Barbara county cities and towns would visit the CSC Youth Education Center and other facilities. Further, it is anticipated that youth and school groups from around the State would visit the Center for directed programs and events.

The **Youth Education Camp** is envisioned as a day camp for public and private school students during the traditional school year, with a separate space camp and teacher/instructor training during summer sessions. The traditional school year component would consist of an introductory camp for elementary age students and an advanced camp for high school students. The introductory camp would be programmed to accommodate fifth grade students, while the advanced camp would accommodate science-focused high school students, particularly those enrolled in physics classes. Both camps would be open to school districts across the State.

Adult Education and Conference Center

The Adult Education and Conference Center would provide an environment for advanced learning and would be accessible to Base personnel, civilian students, aerospace professionals, and the general public. Facilities would include classrooms, meeting rooms, administration offices, a conference hall, a restaurant, and the support services needed to sustain these functions (e.g., administration offices and a catering preparation area).

The **Conference Hall** would be the largest of these facilities and would be a multi-use facility that could house conferences, trade shows, banquets, and other similar activities. The Conference Hall would be able to accommodate an audience of 2,000 for lectures and 1,000 for banquets. Smaller gatherings would also be accommodated by dividing the space with a moveable partition system.

The primary use of the **Classrooms and Meeting Rooms** would be to provide learning centers for various higher education institutions. Typical classrooms would accommodate 20 to 30 students, teaching stations, and storage.

Mission Support Complex

The Mission Support Complex is intended to provide a convenient location for interested firms to lease office and research space. Business operations at the Mission Support Complex would be directly related to the space, engineering, and science industry. The planned facilities include professional office space, as well as a contractor shop that would allow for light assembly of rockets or cargo, testing, and demonstrations. Other facilities would include work place offices and outdoor gardens. Exhibition spaces would also be incorporated to display technology and advances being pioneered by space contractors and agencies. Exhibit spaces could be visited by tour groups originating at the Visitor Center. Individual launch viewing rooms may also be included in the Mission Support Complex that could support a welcome and launch viewing center for VIPs.

Back of House

The final component of the CSC, the Back of House, would serve as a support facility for the four other components. The Back of House would contain administrative offices, a food preparation and storage services center, a commissary and staff lounge, a warehouse,

delivery operations, parking, and a bus arrival/departure facility.

2.2 Construction Activities

Overall, the complete design and full build out of the CSC would span over a 9-year period. Construction activities would last for approximately 7 years, and there would be periods with no construction activity. Construction timelines and durations are provided in Table 2-1. However, operation of the CSC would begin prior to full completion. The first day of operation is planned for July 1, 2012. The permanent Visitor Center is planned to begin operating in July 2015 and the education facilities are planned to begin operating in July 2016. Full build out of the Center is planned to be complete by October 2019.

The CSA is currently negotiating an extended use lease of the property with VAFB. It is anticipated that the lease would be signed in June 2010.

Table 2-1. Phase schedule.

Phase	Start	End	Duration* (years)
Phase 0/1	4Q 2010	4Q 2012	2
Phase 2	1Q 2013	1Q 2016	3
Phase 3	1Q 2017	1Q 2019	2

* Construction would span a 9-year period, with actual construction accounting for a total of 7 years.

2.2.1 Project Phasing and Schedule

The Conceptual Master Plan (Westberg and White 2009) developed for construction of the CSC incorporates a phased approach, allowing for growth of the CSC over time. Development of the CSC is planned in four phases, as shown in the Phasing and Area Diagram in Appendix A. The multiple year construction phasing would allow for the full occupancy of a single phase during the subsequent phase construction.

Table 2-2 summarizes the major facilities planned for construction within each phase.

Table 2-2. Component phasing.

Component	Phase 0/1	Phase 2	Phase 3
Infrastructure			
Mission Support Complex	Buildings MS 1-3 & Parking MS P1		Buildings MS 4-5 & Parking MS P2
Visitor Center		All facilities & parking	
Youth Education Center		All facilities & parking	
Back of House		All facilities & parking	
Adult Education and Conference Center			All facilities & parking

2.2.2 CSC Construction

The project proposed in this EA includes both the construction of the CSC, and its operation. Construction activities and operation of some of the Center components would overlap at times, as described above. At full build out the CSC would provide:

- 468,000 square feet of buildings (includes all levels of buildings);
- 1,584 parking spaces (not including bus parking spaces [33], overflow parking spaces [255], or handicapped parking spaces [52]); and an
- Aboveground, four-level, 201,000 square foot parking structure.

Construction activities included under each phase are described in the following sections. The operation of the CSC is described in Section 2.3.

2.2.2.1 Phase 0

Phase 0 of the project would consist of initial site preparation, demolition, and build out of site infrastructure, including the initial site grading and installation of the ingress and egress roadways onto the site. Along with the installation of all basic utilities, such as temporary electrical and water utilities, a traffic control intersection and acceleration/deceleration lanes would be

constructed. The main entrance and intersection, secondary entrance, main drive, and staff service road would also be built. An initial 25,000 square foot parking lot, approximately 136,000 square feet of paved roadways, and approximately 23,000 square feet of permeable roadways would be installed during Phase 0. Additionally, a fence would be installed around the entire CSC proposed project area, as well as around landscaping along the roadways and within parking areas constructed during this phase.

Demolition and Site Preparation

Prior to construction, all existing infrastructure would either be demolished and removed from the project area or abandoned in place, as appropriate. This infrastructure includes concrete/asphalt access and interior roadways, concrete pads, parking areas, street lights, underground utility structures and utility hookups that would conflict with construction activities, mailboxes, fire hydrants, a bus stop, and a sewage station. Some of the existing concrete/asphalt would be ground up and reused on the site. All unused concrete/asphalt and all other demolition debris would be loaded onto trucks and hauled to the City of Santa Maria landfill (CSML), in accordance with approved traffic control and haul route plans. As appropriate, demolition waste would be segregated into materials that could be disposed of at a compost facility, or otherwise diverted from landfill disposal.

The grid pattern of the project site would be divided into 20 blocks and demolition of infrastructure and utilities would occur in a block-by-block fashion. After demolition, utility trenches would be backfilled and compacted and the site would be cleared of most vegetation. All surface plant material that is removed from the site would be ground up and hauled to the CSML.

Construction Management and Administration

Temporary administrative offices for construction management staff would be constructed adjacent to Hwy 1. Upon completion of Phase 1 Mission Support Complex facilities, construction management and administration may lease tenant space within the complex for their use while Phases 2 and 3 are underway. Construction management would provide a "Contractor's Row" for contractors and vendors working on the site, in the area described above. Depending on each contractor's scope of work, area would be allotted for office use and storage.

Utilities during Phase 0

During Phase 0, temporary electrical, communication, and water utilities would be provided. Onsite Air Force–contracted electricity would be utilized whenever possible. Water trucks would be utilized to provide water until the existing water line could be activated. Chemical toilets would be used during the construction phase of the project. Communications would be via cell phone until communication lines were distributed from existing locations. A temporary utility point of connection would be placed within Contractor's Row, and each contractor would develop their own utilities in concurrence with construction management.

2.2.2.2 Phase 1

Phase 1 would occur concurrently with Phase 0. Overall, Phase 1 would involve construction of 153,000 square feet of development and 530 parking spaces, inclusive of 13 handicap parking stalls. A wastewater reclamation system would be constructed, and a photovoltaic field for power generation would be installed (see Utilities below). The area associated with Phase 1 would be fine graded and hard landscape features, including parking lots and walkways, would be constructed. Phase 1 would also include the completion of fine grading in the western portion of the site to allow for a temporary viewing lawn for space launches.

Mission Support Complex

Phase 1 of construction would include development of Mission Support Complex facilities MS-1 through MS-3 (see Site

Context and Phasing Area Diagram in Appendix A for a diagram of facilities to be built within each phase). Total building square footage in Phase 1, including all floors of the buildings, would be 153,000 square feet. These facilities would include space for offices, shops, and a temporary Visitor Center. The temporary Visitor Center would include educational exhibits, limited food and beverages, and staging areas for public tours of the CSC and the region. Construction management could temporarily utilize some of these offices, as described under Phase 0, during the following phases.

The majority of the Mission Support Complex would be developed within Phase 1. Construction of infrastructure to support the Mission Support Complex and other proposed Phase 1 facilities would include the following elements:

- Installation of building forms and under-slab utilities for MS-1 through MS-3
- Installation of rebar and concrete for MS-1 through MS-3
- Installation of building frames, roofing, siding, and exterior finishes for the Mission Support Complex structures
- Removal of temporary construction measures, such as temporary fencing
- Tenant improvements, such as interior office space remodeling

Phase 1 Parking

A portion of the proposed parking lot for the Mission Support Complex buildings (indicated as MS-P1 on the Site Context plan in Appendix A) would be constructed during this phase. Initially, paved parking would be available for 530 cars, including handicapped stalls. During Phase 1, this lot would be shared between the Mission Support Complex and the Visitor Center. Recreational vehicle parking would be for day use only, as no service hookups would be provided for overnight stays.

CSA plans to incorporate permeable surfaces to parking lots, consistent with amounts/ locations required as a result of the drainage study and plan. Additional permeable parking would be considered when possible and viable.

Utilities

A utility layout plan would be prepared for the project. CSC site utilities would include electrical, telephone, data/fiber, gas, water, sewer, and storm water. The telephone, data/fiber, and gas utilities would be accessed from existing lines. Existing electrical and water connections would be used (see Utility Diagram in Appendix A). For all other utilities, existing utilities point of connection to mainline(s) would be abandoned or resized to meet the CSC demand, depending on agreements with the Air Force and commercial utilities service providers. Where possible, utilities would be placed in common trenches as allowed by building codes.

Wastewater Reclamation Plant

CSA plans to manage domestic wastewater generated at the CSC through onsite reclamation and reuse. The onsite wastewater management system would consist of a collection system, the Wastewater Reclamation Plant (WWRP), and a treated effluent reuse system. Ultra-low flow fixtures would be installed throughout the facilities.

The construction of the WWRP in Phase 1 would include the installation of approximately eight septic tanks, conveyance lines, the tertiary treatment facility, wet season storage, and the reuse infrastructure. The treatment facility would be designed with a contingency to allow for fluctuations in daily flows and population.

The collection system would include a series of septic tanks, dispersed throughout the development, for primary treatment of the raw wastewater. Each tank would be equipped with an effluent filter, duplex septic tank effluent pumps, and a control/alarm panel for conveyance of the liquid waste to the WWRP. Collection system piping would be comprised of small diameter pressure mains, with the largest anticipated diameter being 6 inches.

The treatment system would be configured to produce disinfected tertiary recycled water as defined in Title 22, California Code of Regulations (CCR). The treated effluent would be disposed of through slow-rate percolation and evapotranspiration in landscaped areas. Based on the projected annual volume of 35.8 acre-feet (11,665,465 gallons per year), all of the treated effluent would be beneficially re-used in this manner. The recycled water application area at build out is estimated at 15 planted acres. Onsite soils have low permeability; therefore, evapo-transpiration would be the primary disposal mechanism. The average flow during the winter period is estimated at 20,000 to 30,000 gallons per day. A minimum wet weather storage volume of 8 acre-feet (2,606,811 gallons) is estimated. The estimated footprint of the storage area would be 1.3 acres, which would require removing a maximum of 15,000 cubic yards of soil.

Water

CSA proposes to obtain VAFB–metered service through an existing main, as no alternative services were available. VAFB has indicated that this is a feasible approach for providing water to the Center. Upgrades may be required to adequately supply the CSC. All work associated with the implementation and upgrade of water pipes, storage systems, and tanks would be completed during Phase 1. Any existing water pipes and associated tanks that came in conflict with construction would be abandoned in place or demolished.

Electricity

Initially, CSA would utilize existing overhead lines and purchase power from VAFB. CSA would distribute power to all CSC facilities, including tenants. Ultimately, the CSC would obtain service from Pacific Gas & Electric (PG&E) for the entire Center, once a planned line is completed by PG&E. Acceptance of this approach is dependent on negotiations between VAFB and the CSA.

During Phase 1, a 1-megawatt (MW) photovoltaic field would be installed for onsite generation of power. All work associated with the installation of electricity lines and associated electrical infrastructure (switching station and poles) would be subject to Air Force review and approval.

CSA would also consider the use of rooftop wind power to generate electricity. Use of building-mounted small-scale wind turbines, no more than 2 to 3 feet in diameter, would be considered for use. Turbine design would be specifically selected as to not cause interference with radar operations in the area.

Communication Systems

Verizon Communications and Comcast Corporation offer service to the proposed site, and the service can be obtained from connecting to existing available points. CSA would be responsible for the distribution of service from these connection points. All work associated with the installation of communication lines would be completed during Phase 1.

Natural Gas

All onsite natural gas distribution systems would be abandoned in place or demolished if they came into conflict with new construction. CSA would work with the Southern California Gas Company to provide service to the CSC from existing lines. CSA would be responsible for the distribution of the service to its all CSC facilities and tenants. All work associated with the installation of natural gas lines and associated natural gas distribution system infrastructure (pressure reduction pump) would be completed during Phase 1.

Table 2-3 summarizes the major construction activities that would occur during Phase 0/1.

2.2.2.3 Phase 2

During Phase 2, a total of 152,000 square feet of structural development would be constructed. Approximately 645 parking spaces, inclusive of 28 handicapped parking stalls, plus an additional 33 bus stalls, would be constructed during this phase.

Additionally, 255 overflow parking spaces would be constructed. This area is depicted

Table 2-3. Summary of major construction activities during Phase 0/1.

Activity	Details
Demolish existing infrastructure or abandon in place.	Includes concrete/asphalt access and interior roadways, concrete trailer pads, parking areas, street lights, underground utility structures and utility hookups, mailboxes, fire hydrants, a bus stop, and a sewage station.
Build out initial site infrastructure.	Initial site grading and installation of the main entrance and intersection, secondary entrance, main drive, staff service road, a traffic control intersection and acceleration/deceleration lanes. An initial 25,000 square foot parking lot, 136,000 square feet of paved roadways and 23,000 square feet of permeable roadways. Basic utilities such as temporary electrical and water.
Construct temporary construction management facilities.	Temporary administrative offices adjacent to Hwy 1 at the southeast corner of the site.
Build Mission Support Complex.	3 buildings (MS1 – MS3) ranging in height from 40 to 60 feet for a total of 153,000 square feet of development.
Construct MS-P1 parking.	530 parking spaces, inclusive of 13 handicap stalls.
Build wastewater reclamation plant.	Wastewater reclamation plant and infrastructure, plus estimated storage area of 1.3 acres.
Install photovoltaic field.	1-MW photovoltaic field.
Install utilities.	Includes wastewater, water, electricity, telephonic system, and natural gas.

in the Site Context diagram, designated as VC-01, in Appendix A. The area associated with Phase 2 would be fine graded and hard landscape features, including parking lots and walkways, would be constructed.

Visitor Center, Youth Education Center, and Back of House

The permanent Visitor Center and outdoor amphitheater, the Youth Education Center, the Back of House, and associated infrastructure to support these areas (including attractions, exhibits, and service elements) would be constructed in Phase 2. Construction during this phase would enable large-scale launch viewing events. The construction of Phase 2 facilities would involve the following elements:

- Installation of building forms and underslab utilities for the Visitor Center, Youth Education Center, and Back of House
- Installation of rebar and concrete for the Visitor Center, Youth Education Center, and Back of House
- Installation of building frames, roofing, siding, and exterior finishes for the Visitor Center, Youth Education Center, and Back of House structures
- Connection of Phase 1 utilities and interior roadways to newly constructed facilities
- Removal of temporary construction measures, such as temporary fencing
- Tenant improvements, such as interior office space remodeling
- Completion of storm water retention ponds, if needed, to filter parking lot runoff

Phase 2 Parking and Roadways

Upon completion of the permanent Visitor Center and the Back of House, paved parking (645 spaces, including 28 handicapped stalls) would be provided for day use only. A total of 33 bus spaces would also be built during this phase. To accomplish this, 254,000 square feet of paved parking for the Visitor Center and an additional 24,000 square feet for Back of House parking would be installed, along with approximately 58,000 square feet of paved roadways. Moreover, 90,000 square feet of permeable parking is planned for the site. The parking areas would be connected by approximately 20,000 square feet of additional permeable roadways.

Table 2-4 summarizes the major construction activities that would occur during Phase 2.

Table 2-4. Summary of major construction activities during Phase 2.

Activity	Details
Build Visitor Center, including outdoor amphitheatre.	14 buildings ranging in height from 15 to 50 feet, for a total of 91,560 square feet of development.
Build Youth Education Center.	3 buildings ranging in height from 25 to 30 feet, for a total of 45,700 square feet of development.
Build Back of House.	One 30-foot high building, for a total of 14,800 square feet of development.
Construct Visitor Center and Back of House overflow parking and roadways.	33 bus stalls, 645 parking spaces inclusive of 28 handicapped stalls, and 90,00 square feet of permeable parking for 255 overflow spaces. 58,000 square feet of paved roadways and 20,000 square feet of permeable roadways.
Install storm water retention ponds.	9.8 acres of retention ponds, or as needed to filter parking lot runoff.

2.2.2.4 Phase 3

During Phase 3, 163,000 square feet of structural development plus an aboveground, four-level, 201,000 square foot parking structure would be constructed, for a total of 364,000 square feet of development. Approximately 461 parking spaces, inclusive of 11 handicapped stalls would be built. The area associated with Phase 3 would be fine graded and hard landscape features, including parking lots and walkways, would be constructed.

Adult Education and Conference Center and Mission Support Complex

Construction of the Adult Education and Conference Center, as well as additions to the Mission Support Complex would be completed during Phase 3. Specifically, two office buildings (MS-4 and MS-5) in the Mission Support Complex would be built. Any remaining facilities and support facilities would be completed during this final phase. Similar to previous construction phases, Phase 3 construction activities would involve the following elements:

- Installation of building forms for the Adult Education and Conference Center, and additions to the Mission Support Complex
- Installation of rebar and concrete for the Adult Education and Conference Center and additions to the Mission Support Complex
- Installation of building frames, roofing, siding, and exterior finishes for the Adult Education and Conference Center structures, and additions to the Mission Support Complex structures
- Connection of Phase 1 utilities and interior roadways to newly constructed facilities
- Construction of MS-P2 parking structure
- Removal of temporary construction measures, such as temporary fencing
- Tenant improvements, such as interior office space remodeling

Phase 3 Parking

A 50,000 square foot lot accommodating 113 vehicles, inclusive of five handicapped stalls, would be constructed for the Adult Education Facility. To support expansion of the Mission Support Complex, an aboveground, four-level, 201,000 square foot parking structure (designated as MS-P2 in the Site Context diagram in Appendix A) would be constructed, accommodating a net 348 vehicles, inclusive of six handicapped stalls.

Table 2-5 summarizes the major construction activities that would occur during Phase 3.

2.2.2.5 Landscaping

The CSC site would be highly developed. Much of the site would consist of buildings and structures, with large paved areas designated for vehicle parking and circulation throughout the site. The site would also include development such as retention ponds for water treatment, and pedestrian walkways.

Table 2-5. Summary of major construction activities during Phase 3.

Activity	Details
Build Adult Education and Conference Center.	3 buildings ranging in height from 25 to 50 feet, for a total of 59,000 square feet of development.
Build remaining Mission Support Complex buildings.	2 buildings (MS-4 and MS-5) ranging in height from 40 to 60 feet, for a total of 104,000 square feet of development.
Construct MS-P2 parking structure and Adult Education parking.	Aboveground, four-level, 201,000 square foot parking structure with 348 parking spaces inclusive of 6 handicapped stalls; 113 parking spaces inclusive of 5 handicap stalls for Adult Education Center.

However, landscaping at the CSC would be designed to enhance the aesthetics of the site.

An ecologically appropriate planting design would be developed to minimize water usage and maintenance costs. Landscaping would be designed to incorporate water-saving measures such as: maximizing use of California native plants common to the surrounding natural environment, providing drip irrigation to reduce water usage, using mulch to prevent evaporation, and minimizing the use of turf. Reclaimed water would be utilized whenever possible for landscaping, assuming approval of such uses by the Regional Water Quality Control Board (RWQCB), to reduce water usage for landscape maintenance. Signage, highlighting the use of native plants and water conservation measures, would also provide educational benefits, in keeping with the learning atmosphere of the CSC.

2.2.2.6 Green Building

The CSA would seek certification under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program for the Center. LEED certification is a nationally accepted benchmark for the design, construction, and operation of high performance "green" buildings. CSA would pursue LEED certification at the highest possible level. The following green building methods are under consideration for the CSC:

- Use of local materials, photovoltaic power sources, natural lighting, passive heating and cooling, and wind power;
- Use of energy efficient designs and materials;
- Use of light-emitting diode (LED) light fixtures;
- Use of ultra-low flow fixtures throughout the facility;
- Minimization of waste and emissions;
- Use of permeable pavement for parking surfaces;
- Use of vegetated swales and ponds for water retention; and
- Recycling of domestic wastewater.

During development of each aspect of the CSC, green building methods would be analyzed in depth and incorporated as appropriate, with the goal of achieving LEED certification.

2.2.2.7 General Construction Requirements

Construction of the CSC is scheduled to occur over a 9-year period. Construction activities would be scheduled to begin in the fourth quarter of 2010, and end in the first quarter of 2019. Project activities would occur within 8-hour workdays, and 5-day workweeks. Approximately 50 workers are anticipated to be on the site at a time.

Temporary chain link fencing, 6 feet in height, would be used during all phases of construction to restrict access to construction areas. The administrative offices would be fenced off, and contractors and vendors using Contractor's Row would be required to fence off their sites. With the completion of basic site grubbing, demolition, and rough grading,

construction fencing would be placed around each construction area while work occurs. Construction management would develop a phased access plan to best implement the construction process.

A site soils report, grading plan, and storm water pollution prevention plan (SWPPP) would be completed prior to demolition and site preparation. The project site would then be rough graded and left in a plowed condition, except for those areas that would be used for storm water control measures following the grading plan and SWPPP. Building pad locations and locations with fill material would be over-excavated and compacted in accordance with the soils report.

Table 2-6 provides a representative list of estimated types of equipment and associated use for the proposed project. Although the exact type of equipment may vary slightly from these projections, these estimates provide a basis for analyzing related issues, such as air quality.

A detailed construction traffic plan would be prepared for the project which would include: the number of construction-related trips, the duration of construction for each phase, peak hours of construction, details on deliveries, and descriptions of haul routes for heavy construction equipment and materials. The construction traffic plan would describe haul routes for receiving heavy construction material such as fill, concrete, and steel and for removing waste material from the site to an off-base landfill. An emergency and service route is planned to encircle the interior perimeter of the site. The route would serve as the main artery for all construction traffic entering and leaving the site and would provide access to the work site, administrative offices, and contractor lay down areas. This access system would eventually become the permanent emergency and service routes for the CSC. Construction staging areas would be established on the site.

Table 2-6. Equipment needs for CSC construction. Usage indicated in hours.

Equipment Description	Phase 0	Phase 1	Phase 2	Phase 3	Total	Days
Road Reclaimer CAT RM 350-B	16	0	40	0	56	7
Excavator CAT 330-B	300	332	512	112	1,256	157
Loader CAT 966G	180	100	160	0	440	55
Skid Steer CAT 236	200	80	160	0	440	55
Water Truck	650	398	960	320	2,328	291
Scraper CAT 623F	400	0	0	192	592	74
Scraper CAT 637E	0	0	912	0	912	114
Compactor CAT 815F	0	80	0	64	144	18
Compactor CAT 825G	0	0	304	0	304	38
Motor Grader CAT 140H	150	266	448	64	928	116
Disc CAT Challenger 45	12	12	40	16	80	10
Backhoe CAT 416C	234	235	235	224	928	116
IT Loader CAT IT28G	234	235	235	224	928	116
Base Roller CAT 563C	336	0	144	32	512	64
Skip & Drag John Deere 210C	200	290	200	18	708	88.5
Scraper CAT 613C	100	68	72	16	256	32
Paver CAT AP-1055B	90	0	80	10	180	22.5
Roller CAT CB-634C	90	0	80	10	180	22.5
Roller CAT CB-434C	90	0	80	10	180	22.5
C&G Machine Power Curb 5700-C	44	44	48	8	144	18

All contractor and vendor contracts would contain specific language to ensure all construction monitoring and minimization measures are fully implemented.

2.3 CSC Operation

The first day of operation is planned for July 1, 2012, approximately three quarters of the way through Phase 0/1. The multiple year construction phasing would allow for the full occupancy of a single phase during the subsequent phase construction. The permanent Visitor Center is intended to begin operating in July 2015 and the education facilities are anticipated to begin operating in July 2016. Full build out of the CSC is planned to be complete by October 2019.

Each of the five major components, as well as their planned facilities and functions, activities, and visitor attractions are described in Section 2.1 of this EA. The following sections discuss operational aspects not already covered.

2.3.1 Visitor Site Access

Once operations at the CSC commence, a main entrance would serve visitors, mission support staff, and service and emergency traffic. A second entrance directly adjacent to the proposed Mission Support Complex parking lot area would serve school/tour buses, mission support staff, and service and emergency traffic. It may also be used as a supplemental exit for visitor traffic during special events.

Visitor traffic flow on the site would be limited to a one-way loop circling the main parking area (see Circulation Diagram in Appendix A). Visitor traffic would be directed through a traffic control point before entering the parking area. Mission support staff routes on the site would be separated from visitor traffic to speed traffic flow, and would also have a traffic control point. Finally, a perimeter access system would be established for emergency and service vehicles. Specific safety and security measures would be developed for each facility component, and would be documented in the CSC security plan.

2.3.2 Parking and Drives

Parking would be provided for visitors and users of the Adult Education and Conference Center, Youth Education Center, Back of House, and Mission Support Complex. Planned parking spaces associated with each component are detailed in Table 2-7. Visitors to the Youth Education Center would utilize the Visitor Center parking area.

Approximately 20 acres of the site would be developed for automobile, recreational vehicle, and bus parking. Paved parking, along with

Table 2-7. Planned parking spaces for major components.

Facility*	Parking Spaces	Handicap Spaces	Bus Spaces	Total Spaces**
Mission Support Complex	859†	19‡	0	**878**
Back of House	76	4	6	**86**
Visitor Center	541	24	27	**592**
Adult Education and Conference Center	108	5	0	**113**
TOTAL	**1,584**	**52**	**33**	**1,669**

Notes:
* indicates the Youth Education Center is not included as it utilizes the Visitor Center parking lots.
** indicates these numbers do not include the 255 overflow parking spaces.
† 517 in Phase 1; 342 in Phase 3
‡ 13 in Phase 1; 6 in Phase 3

permeable parking areas and a parking structure, would be constructed during all phases of the project. At full build out, paved parking for 1,584 cars plus an additional 52 handicapped stalls and 33 bus spaces would be provided. Overflow parking for 255 more vehicles would be available for launch events. A total of approximately 237,000 square feet of roadways (194,000 paved and 43,000 permeable) would be available to move vehicles throughout the site.

2.3.3 Employee and Visitor Numbers, and Hours of Operation

At full build out the CSC is expected to provide facilities and space for 1,713 permanent jobs, and attract between 200,000 and 500,000 visitors per year. Complexes would open and close at different hours depending on their functions. Table 2-8 lists expected hours of operation, lengths of visits, and expected numbers of employees and visitors at each component of the CSC. (Note: in this EA, 500,000 visitors, the maximum projected, was used for all analyses.)

2.3.4 CSC Daily Operations and Other Anticipated Events

Daily operations at the CSC would be multifaceted, with each CSC component functioning in a unique capacity. The Mission Support Complex would mainly function as a business park. The Youth Education Center and the Adult Education Center would largely function like schools, while the Conference Center would host conferences, trade shows, exhibitions, meetings, and banquets, holding up to 2,000 visitors for lectures and 1,000 visitors for banquets. The Visitor Center would function similarly to a museum. The Back of House would function similarly to an administrative office area with delivery and warehouse operations.

In addition to its daily operations, it is anticipated that the amphitheater at the Visitor Center would be used to view launches up to approximately 12 times per year, attracting between 1,000 and 2,000 visitors per launch. The amphitheater could also be used for entertainment activities, such as live performances, films, and public exhibitions, as well as for civilian and military ceremonies, special presentations, and education forums.

2.4 Proposed Action

Under the Proposed Action, the CSC would be constructed and operated at the former Lake Canyon Trailer Park No. 7 site on VAFB. This site is approximately 71 acres and is located at the intersection of Hwy 1 and Azalea Lane,

Table 2-8. Estimated operating hours, visit durations, and employee and visitor numbers.

Component	Hours of Operation	Duration of Visit (Hours)	Number of Employees[#]	Visitors per Year
Mission Support Complex	24 hours/day	9	1,223	N/A
Visitor Center	10:00 AM - 6:00 PM	4	183	200,000 to 500,000‡
Back of House	8:00 AM - 10:00 PM	4	*	N/A
Adult Education and Conference Center	8:00 AM - 10:00 PM	Vary by function	100	**
Youth Education Center	8:00 AM - 4:00 PM	8	27	**

Notes:
# indicates that in addition to the employee numbers described in the table, an additional 180 jobs are projected from visitor spending (Productive Impact LLC 2008).
‡ indicates that in this EA, 500,000 visitors (the maximum projected) was used for all analyses.
* indicates that employee numbers for Back of House are already included in Visitor Center and Mission Support Complex numbers.
** indicates these visitor numbers are included in the Visitor Center number.

outside of Base entry control (Figure 2-1). A 1.3-mile utility line corridor (20 feet wide), running south of and parallel to Hwy 1, is included as part of the site.

Site Plan

A conceptual site plan for the CSC at this site is provided in the Conceptual Master Plan (Westberg and White 2009) in Appendix A (see Site Context). The Visitor Center would be located at the western portion of the site and would be bordered by open space to the west, the Back of House to the southeast, and the Youth Education Center to the south.

Locating the Visitor Center facilities next to open space would allow for unobstructed views of launches from SLCs 3 and 4. The Mission Support Complex would be located east of the Visitor Center, and the Youth Education Center would be located southeast of the Visitor Center. The Adult Education and Conference Center would be centrally located on the site near Hwy 1. This location would afford visibility of the Adult Education and Conference Center by traffic along Hwy 1, and be more readily accessible from the main entrance. The Mission Support Complex would be located along the southeastern corner of the site, east of the Visitor and Youth Education Centers, with the associated parking located next to Hwy 1. A pedestrian route would go through the core of the Mission Support Complex, and would connect to both the Visitor Center and the Adult Education and Conference Center.

The Back of House would be centrally located among the other facilities to facilitate support operations. It would be accessed off a secondary entrance to minimize interactions between visitors and support employees.

Site Access

The current main entrance to the site at the intersection of Hwy 1 and Azalea Lane would be used for site access throughout demolition and construction. Proposed access routes, including alternatives, and circulation routes have been developed for the Proposed Action, and are described in the *Revised Traffic, Circulation, and Parking Study* for the California Space Center Project (Associated Transportation Engineers [ATE] 2009), hereafter referred to as the Traffic Study. Site development and construction could start before the Azalea Lane intersection is fully developed. During construction, the intersection may be signalized or managed with traffic control personnel in coordination with the California Department of Transportation (Caltrans). Mitigation measures, as detailed in the Traffic Study, and coordinated with Caltrans, would be implemented during appropriate phases. These measures are further described in Chapter 4 of this EA, in the Transportation section (Section 4.10).

The main entrance intersection at Azalea Way and Hwy 1, at the northeast corner of the site, would be modified to accommodate a full signal. The Azalea Way approach would be configured with two entering and two exiting lanes (one right-turn lane and one left-turn lane) to support the heavier traffic flows anticipated during special events. A left-turn queue of 170 feet for the Hwy 1 northbound left-turns into the site would be incorporated. The Hwy 1 northbound left-turn lane would be extended to a minimum of 425 feet to meet Caltrans recommendations for deceleration lengths. The proposed right-turn lane on southbound Hwy 1 would also be a minimum of 425 feet in length.

The secondary driveway would be constructed at the southeastern corner of the CSC facility. This driveway would provide “right-turn-only” access to Hwy 1 from the Center, and would not allow travelers to cross over to northbound Hwy 1. A right-turn deceleration lane for traffic entering the driveway would be constructed to meet the Caltrans minimum length recommendation. No acceleration lane (according to Caltrans public intersection standards) would be constructed for exiting traffic, requiring drivers to wait for an acceptable gap to turn onto Hwy 1. The Traffic Study also includes analysis of three additional alternative access plans for consideration. Because traffic impacts at these intersections would be due solely to the construction and operation of the CSC, the CSA would be responsible for fully funding the proposed changes at these intersections.

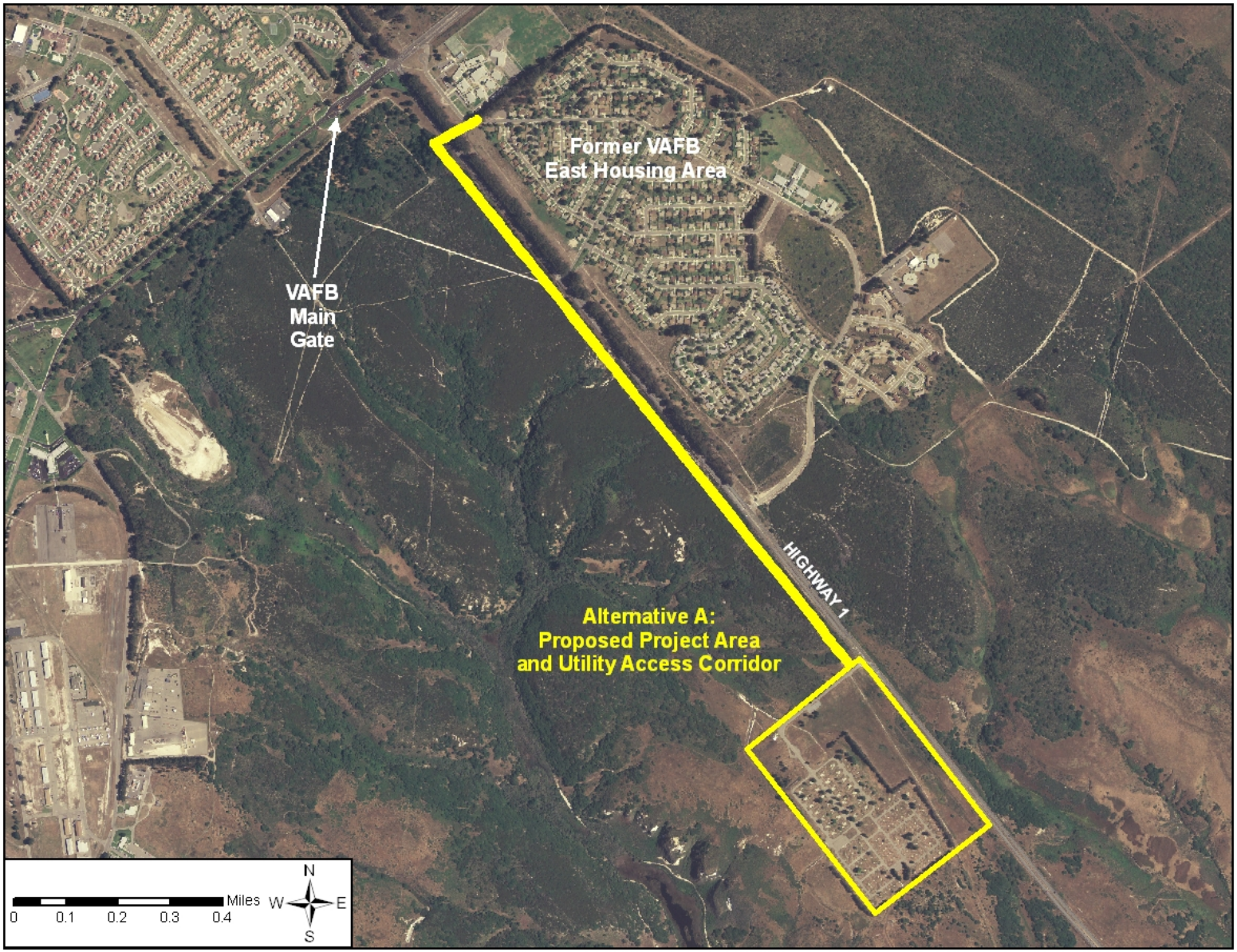

Figure 2-1. Extent of the Proposed Action project area.

Utilities

The existing utilities within the project site and proposed upgrades are shown in the Utility Diagram in Appendix A.

CSA proposes to obtain VAFB–metered water service at a point of demarcation through an existing main along Hwy 1. A 1.3-mile long, 20-foot wide access corridor along this waterline is included within the proposed project area to account for any disturbances resulting from required upgrades.

The Southern California Gas Company currently has a high pressure gas transmission line on the west side of Hwy 1. The gas company has offered to provide service to the CSC from this line by installing a pressure reduction station.

2.5 No-Action Alternative

Under the No-Action Alternative, the CSC would not be constructed or operated. The CSC site under the Proposed Action would continue to exist as an abandoned trailer park. While this alternative would result in no effects to the existing environment, it also would eliminate the CSC educational opportunities for students and adults. In addition, it would eliminate an additional safe viewing area for launches from VAFB. The No-Action Alternative would also diminish the economic outlook for the northern Santa Barbara County area.

2.6 Other Alternatives Considered

The CSA established criteria for selecting a site for construction and operation of the CSC based on its mission, and the goals for the Center. These criteria include:

- Minimum of 50 acres
- Minimal environmental impacts
- Proximity to VAFB
- Suitable topography for construction
- Direct line of sight to SLC-3 and SLC-4 launch pads
- Adequate location for launch viewing area
- Accessibility to the public
- Proximity to existing available utilities
- Ability to install anti-terrorism features

In addition to the CSA criteria, costs that would be incurred by the Air Force to prepare a site for development and use by a non-Air Force proponent were also considered. These costs would include those such as for investigation/remediation of Installation Restoration Program (IRP) sites, as well as those for subsurface investigations of ordnance areas.

The following alternative locations were identified but were not further considered as alternatives for the proposed project.

2.6.1 VAFB East Family Housing

A 71-acre site located on the east side of Hwy 1, in the southern portion of the former VAFB East Family Housing was considered. Requirements for construction and operation were anticipated to be similar to those of the Proposed Action. However, the layout of the site would have to be altered to accommodate this location on the east side of Hwy 1.

An evaluation of this site identified that its development would incur considerable Air Force costs for the following actions:

1) As VAFB was once an Army training facility, infantry divisions trained there for combat from the early 1940s until the end of World War II. At that time, the majority of buildings were heated by fuel oil, stored in underground storage tanks (USTs). These potential UST sites require additional investigation to determine the extent of the contamination and to determine if remediation would ultimately be required. Based on past projects within the housing area, investigation/remediation costs at this site were estimated to be between $2 and 4 million (K. Domako, 30th Civil Engineer Squadron Asset Management Flight, Asset

Optimization [30 CES/CEAO] personal communication).

2) A Military Munitions Response Program (MMRP) investigation was conducted in East Family Housing in 2007, and resulted in 7,000 anomalies requiring further investigation. The cost for clearing a 70-acre surface clearance area was estimated at $161,000, while subsurface investigations were estimated at between $1.5 to 2 million, depending on variables (K. Domako, 30 CES/CEAO personal communication).

3) Finally, Air Force costs incurred for required utility and slab demolition at this site would be approximately $450,000 (K. Domako, 30 CES/CEAO personal communication).

Under the CSA criteria, an evaluation of this site identified it as being less desirable and not fully meeting the selection standards for the CSC. Although the site provides direct line of sight to SLCs 3 and 4, topography and terrain to the west-southwest of the site restricts the view to the northwestern portion of the site, and would require that the viewing platform be elevated a minimum of 15 feet to adequately see the launch complexes. The row of trees present along the east side of Hwy 1 would be removed at this location; however, this would not resolve the direct line of sight concern. As a result of these limitations, the launch viewing area at the Visitor Center would need to be located adjacent to the highway (at the northwest corner of the site) to provide the best unobstructed viewing of space launches. Locating the viewing area next to the highway would not be optimal given that noise from the highway could interfere with events and activities at the amphitheater.

Because the launch viewing area would need to be located adjacent to the highway, the Adult Education and Conference Center would have to be located towards the back (east side) of the site. This significantly reduces the anticipated public exposure to the Center and may reduce public attendance.

This alternative was not carried forward due to the costs incurred by the Air Force to develop this site, as well as because it did not fully meet the CSA criteria.

2.6.2 Ken Adam Park

A third location at Ken Adam Park in Lompoc, California was considered for the proposed project and later discarded. Under this alternative, requirements for construction and operation were anticipated to be similar to those of the Proposed Action. However, the layout of the Center would have to be altered significantly to accommodate this location.

Ken Adam Park, located next to Alan Hancock College, was considered as an alternative site for the CSC due to the availability of space for development. A closer evaluation of this site identified it as being inadequate for the CSC for the reasons listed below.

The area available for development at this site does not meet the space requirements for the planned CSC (a minimum of 50 acres). This site would have to be developed "vertically" given that the available area is less than the required 50 acres. Accessibility, research space for industry, exhibition space, conference hall, and a viewing arena would be compromised or unfeasible within a "vertical" development.

Direct line of sight from the viewing amphitheater to launch facilities (SLCs 3 and 4) is essential. This site is not located at an appropriate elevation to offer a direct line of sight to the south VAFB launch facilities. As described in Chapter 1, the purpose of the CSC is to educate and inspire. One of the most important elements of the CSC is to provide a viewing area for launches. When a space launch from VAFB occurs during daylight hours, the public concentrates at various locations, regardless of the hazards it may pose, to be witness to the achievements of space enterprise. Given that VAFB is the only location on the West Coast of the U.S. that provides this opportunity, a space center that is located in the vicinity of the Base, but does not provide this opportunity, would not

meet the needs of the public or accomplish the CSC mission.

To attract aerospace businesses and VAFB support organizations, the Mission Support Complex must offer easy and convenient access to VAFB, which would set it apart from other business parks in the local area. This site does not provide this advantage given that it is further away from the main cantonment area (than the proposed site), where most of VAFB's administrative functions are located.

There is an intrinsic value associated with having the CSC project site located on VAFB property that offers the Center its greatest potential to entice visitors and students to visit, as well as to attract aerospace businesses to the Mission Support Complex. Although near VAFB, the Ken Adam Park site is less desirable because it would increase the travel time from the Mission Support Complex to VAFB's Main Gate.

This site is located outside of federal lands and would fall under the jurisdiction of the State of California and the County of Santa Barbara. The site is vegetated with a mixture of Burton Mesa chaparral and coastal live oaks, both of which are considered sensitive resources by the State and the County. Development of the site would require the removal of most, if not all of the vegetation, to accommodate construction of facilities, resulting in adverse effects to these sensitive resources. Additionally, biological surveys would need to be completed to document whether other sensitive resources, or resources with protection status under state, county, or local regulations and laws, are present within the site.

The presence of cultural resources at this site has not been investigated. Given that the site is for the most part undeveloped, with the exception of an access road and the presence of Hancock College adjacent to the site, archaeological surveys would need to be completed to document whether any resources are present. Because of the abundance of Native American resources in the region, the presence of resources at this alternative location would be possible.

While potential environmental effects on resources at this site were not evaluated, this site was eliminated from further consideration because it did not meet several of the selection criteria identified for the CSC, because of potential adverse effects on sensitive biological resources, and the potential for the presence of cultural resources.

2.7 Comparison of Alternatives

Table 2-9 provides a comparison of the potential environmental effects on resources from the Proposed Action and the No-Action Alternative (see detailed analyses in Chapter 4).

Table 2-9. Comparison of potential environmental effects from the Proposed Action and the No-Action Alternative.

Resource	Proposed Action	No-Action Alternative
Air quality	Potential air impacts could result from construction and operational emissions associated with the CSC.	No impacts.
Biological Resources	Potential short-term impacts to plant communities within the utility corridor and buffer area of the site during construction. Wetlands that can be preserved (0.38 acre) would be fenced off to avoid adverse effects during construction. Best Management Practices, i.e., dust control measures, etc. (described in Section 4.1.2) would be implemented. Permanent loss of approximately 0.46 acre of wetlands due to construction activities within the site would be compensated through re-creation of wetlands outside project area and measures included in Clean Water Act Section 401 and 404 permits would be implemented to ensure no net loss of wetlands. Loss of vernal pool fairy shrimp (*Branchinecta lynchi*) habitat to be re-created outside project area for no net loss. Potential adverse effects to California red-legged frogs (*Rana draytonii*)	No impacts.

Resource	Proposed Action	No-Action Alternative
	are less than significant with minimization measures. No adverse effects to El Segundo blue butterfly (*Euphilotes battoides allyni).* Loss of potential El Segundo blue butterfly habitat to be compensated at a pre-designated restoration area on VAFB.	
Cultural resources	No archaeological or historical architectural resources or Native American sacred sites exist within the project site. Only one isolated artifact has been identified within the main parcel and subsequent subsurface testing in that area did not find any additional cultural materials.	No impacts.
Earth Resources	Potential short-term impacts resulting from soil disturbance are anticipated. No long-term impacts anticipated.	No impacts.
Hazardous Materials and Hazardous Waste Management	No short-term impacts are anticipated with appropriate storage and use of hazardous materials and appropriate hazardous waste management. No long-term impacts anticipated.	No impacts.
Human Health and Safety	No impacts are anticipated. Occupational Safety and Health Administration regulations would be followed and fully implemented to protect all workers during construction. During operation of the CSC, safety would be increased during launch events by providing the public with a venue from which launches could be viewed safely, without hazards present from roadsides.	No impacts are anticipated except for the recurring safety hazard to the public during launches, due to the lack of established viewing areas present outside of VAFB.
Land Use and Aesthetics	No adverse impacts are anticipated. Construction of the CSC would not result in a conversion of prime agricultural land or cause a decrease in the utilization of land. Construction would not result in restrictions to development of facilities or activities associated with the VAFB mission. The proposed project is not expected to adversely affect recreation and would provide additional opportunities for the public. All construction would occur within the boundaries of the previously developed area. The aesthetics of the site would be improved by redeveloping an abandoned pre-developed area.	No impacts.
Socioeconomics	Some aspects of the socioeconomic environment (i.e. emergency services, housing and office space vacancy, and existing recreational opportunities) may be affected either in a positive or a negative manner, depending on the demographic trends at the time of full build out of the CSC. However, it is anticipated that the overall effects would be positive for the community, as the CSC would provide opportunities for education, new recreational activities, and additional employment. From the economic perspective, the proposed project would have a beneficial impact on the regional (northern Santa Barbara County) economy by providing industrial/business space, creating job opportunities, and increasing the local tax revenue.	The existing socioeconomic environment would not be changed. The anticipated socioeconomic benefits would not be realized.
Solid Waste	No adverse impacts are anticipated. Construction and demolition debris and miscellaneous waste generated by construction workers would be disposed of or recycled by construction contractors per federal, state, and local regulatory requirements, permit conditions, and contract specifications.	No impacts.
Transportation	Increases to traffic during construction of the CSC would occur as a result of commuting by construction workers and trucks transporting materials and equipment. A traffic control plan would be developed in coordination with the California Highway Patrol to ensure impacts to traffic are less than significant. The operation of the CSC is expected to increase the average daily traffic, due to trips by employees and visitors to the CSC. Minor impacts to traffic at specific intersections are anticipated to occur as a result of the operation of the CSC. Implementing the minimization measures, as described in the EA, should result in impacts that are less than significant and within adequate traffic and circulation levels.	No impacts.
Water Resources	No adverse impacts to surface waters and groundwater are anticipated with implementation of design measures.	No impacts.

Chapter 3. Affected Environment

This chapter describes the existing environmental conditions near and within the Proposed Action site that have the potential to be affected by the Proposed Action. The area considered for each resource was commensurate with the resource analyzed. Thus, while for some resources only the immediate area was considered, for others a wider regional area was used.

3.1 Air Quality

Air quality is defined by ambient air concentrations of specific pollutants determined by the U.S. Environmental Protection Agency (EPA) to be of concern with respect to the health and welfare of the general public. Seven major pollutants of concern, called "criteria pollutants," are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), suspended particulate matter less than or equal to 10 microns in diameter (PM_{10}), fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead (Pb). The U.S. EPA has established National Ambient Air Quality Standards (NAAQS) for these pollutants. Areas that violate a federal air quality standard are designated as non-attainment areas.

Ambient air quality refers to the atmospheric concentration of a specific compound (amount of pollutants in a specified volume of air) that occurs at a particular geographic location. The ambient air quality levels measured at a particular location are determined by the interactions of emissions, meteorology, and chemistry. Emission considerations include the types, amounts, and locations of pollutants emitted into the atmosphere. Meteorological considerations include wind and precipitation patterns affecting the distribution, dilution, and removal of pollutant emissions. Chemical reactions can transform pollutant emissions into other chemical substances. Ambient air quality data are generally reported as a mass per unit volume (e.g., micrograms per cubic meter of air) or as a volume fraction (e.g., parts per million [ppm] by volume).

Pollutant emissions typically refer to the amount of pollutants or pollutant precursors introduced into the atmosphere by a source or group of sources. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly affecting the pollutant concentrations measured in the ambient air or by interacting in the atmosphere to form criteria pollutants. Primary pollutants, such as CO, SO_2, Pb, and some particulates, are emitted directly into the atmosphere from emission sources. Secondary pollutants, such as O_3, NO_2, and some particulates, are formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes. PM_{10} and $PM_{2.5}$ are generated as primary pollutants by various mechanical processes (e.g., abrasion, erosion, mixing, or atomization) or combustion processes. However, PM_{10} and $PM_{2.5}$ can also be formed as secondary pollutants through chemical reactions or by gaseous pollutants condensing into fine aerosols. In general, emissions that are considered "precursors" to secondary pollutants in the atmosphere (such as reactive organic gases [ROG] and oxides of nitrogen [NOx], which are considered precursors for O_3), are the pollutants for which emissions are evaluated to control the level of O_3 in the ambient air.

The State of California has identified four additional pollutants for ambient air quality standards: visibility reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. The California Air Resources Board (CARB) has also established the more stringent

California Ambient Air Quality Standards (CAAQS). Areas within California in which ambient air concentrations of a pollutant are higher than the state and/or federal standard are considered to be non-attainment for that pollutant. Table 3-1 shows both the federal and state ambient air quality standards.

Toxic air pollutants, also called hazardous air pollutants, are a class of pollutants that do not have ambient air quality standards but are examined on an individual basis when there is a source of these pollutants. The State of California has identified particulate emissions from diesel engines as a toxic air pollutant.

Global temperatures are moderated by naturally occurring atmospheric gases, including water vapor, carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), which are known as greenhouse gases (GHG). These gases allow solar radiation (sunlight) into the Earth's atmosphere, but prevent radiative heat from escaping, thus warming the Earth's atmosphere. Gases that trap heat in the atmosphere are often called GHG, analogous to a greenhouse. GHG are emitted by both natural processes and human activities. State law defines GHG as any of the following compounds: CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (California Health and Safety Code Section 38505[g]). GHG have varying global warming potential (GWP). The GWP is the potential of a gas or aerosol to trap heat in the atmosphere; it is the "cumulative radiative forcing effect of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas" (U.S. EPA 2006). The reference gas for GWP is CO_2; therefore, CO_2 has a GWP of 1. The other main GHG that have been attributed to human activity include CH_4, which has a GWP of 21, and N_2O, which has a GWP of 310. CO_2, followed by CH_4 and N_2O, are the most common GHG that result from human activity. CO_2, and to a lesser extent, CH_4 and N_2O, are products of combustion and are generated from stationary combustion sources as well as vehicles. High global warming potential gases include GHG that are used in refrigeration/cooling systems such as chlorofluorocarbons and HFCs.

3.1.1 Region of Influence

Specifically identifying the region of influence (ROI) for air quality requires knowledge of the type of pollutant, emission rates of the pollutant source, proximity to other emission sources, and local and regional meteorology. For inert pollutants (all pollutants other than ozone and its precursors), the ROI is generally limited to a few miles downwind from the source. However, for photochemical pollutants such as ozone, the ROI may extend much farther downwind. Ozone is a secondary pollutant that is formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors (ROG, NOx, and PM_{10}). The maximum effect of precursors on ozone levels tends to occur several hours after the time of emission during periods of high solar load and may occur many miles from the source. Ozone and ozone precursors transported from other regions can also combine with local emissions to produce high local ozone concentrations. The ROI for the CSC includes the South Central Coast Air Basin (SCCAB).

3.1.2 Regional Setting

VAFB is within Santa Barbara County and under the jurisdiction of the Santa Barbara County Air Pollution Control District (SBCAPCD). The SBCAPCD is the agency responsible for the administration of federal and state air quality laws, regulations, and policies in Santa Barbara County, which is within the SCCAB. The SCCAB includes San Luis Obispo, Santa Barbara, and Ventura counties.

The SCCAB, and all of Southern California, lies in a semi-permanent high-pressure zone of the Eastern Pacific Region. The coastal area is characterized by sparse rainfall, most of which occurs in the winter season, and hot dry summers, tempered by cooling sea breezes. In Santa Barbara County, the months of heaviest precipitation are

Table 3-1. Ambient air quality standards.

Pollutant	Averaging Time	NAAQS[1]		CAAQS[2]
		Primary[3]	Secondary[4]	Concentration[5]
Ozone (O_3)[6]	8-hour	0.08 ppm	Same as Primary Standard	0.07 ppm (137 μg/m^3) N[ote7]
	1-hour	--		0.09 ppm (180 μg/m^3)
Carbon Monoxide (CO)	8-hour	9 ppm (10 mg/m^3)	None	9.0 ppm (10 μg/m^3)
	1-hour	35 ppm (40 mg/m^3)		20.0 ppm (23 μg/m^3)
Nitrogen Dioxide (NO_2)	Annual Average	0.053 ppm (100 μg/m^3)	Same as Primary Standard	0.03 ppm (56 μg/m^3)
	1-hour	--		0.18 ppm (338 μg/m^3)
Sulfur Dioxide (SO_2)	Annual Average	0.03 ppm (80 μg/m^3)	--	--
	24-hour	0.14 ppm (365 μg/m^3)	--	0.04 ppm (105 μg/m^3)
	3-hour	--	0.5 ppm (1300 μg/m^3)	--
	1-hour	--	--	0.25 ppm (655 μg/m^3)
Suspended Particulate Matter (PM_{10})	Annual Arithmetic Mean	--	Same as Primary Standard	20 μg/m^3 (Note 8)
	24-hour	150 μg/m^3		50 μg/m^3
Fine Particulate Matter ($PM_{2.5}$)[6]	Annual Arithmetic Mean	15 μg/m^3	Same as Primary Standard	12 μg/m^3 (Note 8)
	24-hour	35 μg/m^3		--
Lead (Pb)[9]	30-day average	--	--	1.5 μg/m^3
	Calendar Quarter	1.5 μg/m^3	Same as Primary Standard	--
	3-month rolling average	0.15 μg/m^3		--
Hydrogen Sulfide (H_2S)	1-hour	No Federal Standards		0.03 ppm (42 μg/m^3)
Sulfates (SO_4)	24-hour			25 μg/m^3
Visibility Reducing Particles	8-hour (10 am to 6 pm, Pacific Standard Time)			In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%.
Vinyl Chloride[9]	24-hour			0.01 ppm (26 μg/m^3)

NOTES:

1. NAAQS (other than O3, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The O3 standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current federal policies.

2. CAAQS for O3, CO (except Lake Tahoe), SO2 (1- and 24-hour), NO2, PM10, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded.

3. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

4. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

5 Concentration expressed first in units in which it was promulgated. Ppm in this table refers to ppm by volume or micromoles of pollutant per mole of gas.

6. New federal 8-hour ozone and fine particulate matter standards were promulgated by U.S. EPA on 18 July 1997. The federal 1-hour O3 standard continues to apply in areas that violated the standard. On 15 April 2004, the U.S. EPA issued attainment designations for the 8-hour standard and described plans for the phase out of the 1-hour standard (U.S. EPA 2004).

7. Approved by the CARB on 28 April 2005 and became effective on 17 May 2006.

8 On 5 June 2003, the Office of Administrative Law approved the amendments to the regulations for the state ambient air quality standards for particulate matter and sulfates. Those amendments established a new annual average standard for PM2.5 of 12 µg/m3 and reduced the level of the annual average standard for PM10 to 20 µg/m3. The approved amendments were filed with the Secretary of State on 5 June 2003. The regulations became effective on 5 July 2003.

9 The CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

mg/m3 – milligrams per cubic meter µg/m3 = micrograms per cubic meter

Source: CARB 2009, U.S. EPA 2009a

November through April, averaging 14.66 inches annually. The annual mean temperature in the VAFB area, as reported by monitors in Lompoc, is 58.4°Fahrenheit (°F) and the annual mean maximum and minimum temperatures are 69.8°F and 47.1°F, respectively (WRCC 2007).

Santa Barbara County is classified as an attainment/unclassified area for the NAAQS for all criteria pollutants. Santa Barbara County is considered a non-attainment area for the CAAQS for ozone and PM_{10}. Santa Barbara County is classified as an attainment/unclassified area for the CAAQS for all other criteria pollutants.

The CARB and SBCAPCD operate a network of ambient air monitoring stations throughout Santa Barbara County. The purpose of the monitoring stations is to measure ambient concentrations of pollutants and determine whether the ambient air quality meets the CAAQS and the NAAQS. The nearest ambient monitoring stations to the proposed project area is the Lompoc South H Street and the Lompoc HS&P monitoring stations. The Lompoc South H Street station measures all criteria pollutants, but only commenced monitoring $PM_{2.5}$ in 2007. The only monitoring stations within Santa Barbara County that has monitored $PM_{2.5}$ for the period 2006 through 2008 are located on Broadway Street in Santa Maria and at 700 East Canon Perdido Street in Santa Barbara. Existing air quality conditions over the last three years are presented in Table 3-2.

The 1-hour CAAQS for ozone were not exceeded at the VAFB monitoring station during the period from 2004 through 2006 (most recent data available). The federal 8-hour ozone standard was not exceeded at the VAFB monitoring station during the period from 2004 through 2006.

Table 3-2. Existing air quality conditions (concentrations in ppm unless otherwise indicated).

Pollutant	Averaging Time	2006	2007	2008	CAAQS (ppm)	NAAQS[1] (ppm)	Monitoring Station
Ozone	8-hour	0.054	0.062	0.074	0.070	0.075	Lompoc S. H Street
	1-hour	0.056	0.078	0.082	0.09	-	Lompoc S. H Street
PM_{10}[2]	Annual Arithmetic Mean	17.2 µg/m^3	19.6 µg/m^3	20.9 µg/m^3	20 µg/m^3	-	Lompoc S. H Street
	24-hour	46.9 µg/m^3	37.8 µg/m^3	47.7 µg/m^3	50 µg/m^3	150 µg/m^3	Lompoc S. H Street
$PM_{2.5}$	Annual Arithmetic Mean	10.1 µg/m^3	9.5 µg/m^3	10.4 µg/m^3	12 µg/m^3	15 µg/m^3	Canon Perdido
	24-hour	27.9 µg/m^3	23.5 µg/m^3	44.2 µg/m^3	-	35 µg/m^3	Canon Perdido
NO_2	Annual	0.005	0.005	0.003	0.030	0.053	Lompoc S. H Street
	1-hour	0.037	0.037	0.037	0.18	-	Lompoc S. H Street
CO	8-hour	1.09	1.18	1.06	9.0	9	Lompoc S. H Street
	1-hour	2.3	4.6	2.1	20	35	Lompoc S. H Street
SO_2	Annual	0.000	0.000	0.000	-	0.030	Lompoc S. H Street
	24-hour	0.002	0.003	0.002	0.04	0.14	Lompoc S. H Street
	3-hour	0.003	0.005	0.003	-	0.5	Lompoc S. H Street
	1-hour	0.006	0.011	0.0047	0.25	-	Lompoc S. H Street

NOTES:
1. Secondary NAAQS
2. California averages reported for PM_{10}

SOURCE: www.arb.ca.gov (all pollutants except 1-hour CO and 1-hour and 3-hour SO_2 and annual data for 2005)
www.epa.gov/air/data/monvals.html (1-hour CO and 1-hour and 3-hour SO_2 and annual data for 2005)

The federal PM_{10} standards were not exceeded at the VAFB monitoring station during the period from 2004 through 2006. The CAAQS for PM_{10} was exceeded once during that period. The data from the monitoring stations indicate that air quality is in attainment of all other state and federal standards.

3.1.3 Federal Requirements

The U.S. EPA is the agency responsible for enforcing the Clean Air Act (CAA) of 1970 and its 1977 and 1990 amendments. The purpose of the CAA is to establish NAAQS, to classify areas as to their attainment status relative to the NAAQS, to develop schedules and strategies to meet the NAAQS, and to regulate emissions of criteria pollutants and air toxics to protect public health and welfare. Under the CAA, individual states are allowed to adopt ambient air quality standards and other regulations, provided they are at least as stringent as federal standards. The Clean Air Act Amendments (CAAA) of 1990 established new deadlines for achievement of the NAAQS, dependent upon the severity of non-attainment.

The U.S. EPA requires each state to prepare a State Implementation Plan (SIP), which describes how that state will achieve compliance with the NAAQS. A SIP is a compilation of goals, strategies, schedules, and enforcement actions that will lead the state into compliance with all federal air quality standards. Each change to a compliance schedule or plan must be incorporated into the SIP. In California, the SIP consists of separate elements for each air basin, depending on the attainment status of that air basin.

The CAAA also require that states develop an operating permit program that would require permits for all major sources of pollutants. The program would be designed to reduce mobile source emissions and control emissions of hazardous air pollutants through establishing control technology guidelines for various classes of emission sources.

New Source Review. A New Source Review (NSR) is required when a source has the potential to emit any pollutant regulated under the CAA in amounts equal to or exceeding specified major source thresholds (100 or 250 tons per year) which are predicated on a source's industrial category. A major modification to the source also triggers an NSR. A major modification is a physical change or change in the method of operation at an existing major source that causes a significant "net emissions increase" at that source of any pollutant regulated under the CAA. Any new or modified stationary emission sources require permits from the SBCAPCD to construct and operate. Through the SBCAPCD's permitting processes, all stationary sources are reviewed and are subject to an NSR process. The NSR process ensures that factors such as the availability of emission offsets and their ability to reduce emissions are addressed.

Executive Order 12088. EO 12088, *Federal Compliance with Pollution Control Standards*, requires the head of each federal agency to comply with "applicable pollution control standards" defined as "the same substantive, procedural, and other requirements that would apply to a private person." The EO further requires federal agencies to cooperate with the U.S. EPA, state, and local environmental regulatory officials. To ensure their cost-effective and timely compliance with applicable pollution control standards, the U.S. EPA Administrator is required to provide technical advice and assistance to executive agencies. EO 12088 also provides that disputes between the U.S. EPA and other federal agencies, regarding environmental violations, shall be elevated to the Office of Management and Budget for resolution. EO 13432 revoked Section 1-4, *Pollution Control Plan*, of EO 12088.

Executive Order 13423. On January 24, 2007, President Bush issued EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*. One of the main requirements established under this EO is the reduction of GHG through a reduction in energy intensity of

3 percent per year or 30 percent by the end of fiscal year 2015.

Executive Order 13432. This EO, entitled *Cooperation Among Agencies in Protecting the Environment with Respect to Greenhouse Gas Emissions from Motor Vehicles, Nonroad Vehicles, and Nonroad Engines*, was issued to ensure that all necessary actions are taken to integrate environmental accountability in agency day-to-day decision making and long-term planning processes, across all agency missions, activities, and functions. Pollution prevention is highlighted as a key aspect to the environmental management system process. The head of each federal agency is responsible for ensuring that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision making and long-term planning processes, across all agency missions, activities, and functions. Consequently, environmental management considerations must be a fundamental and integral component of federal government policies, operations, planning, and management. The head of each federal agency is responsible for meeting the goals and requirements of this order. Examples of environmental requirements include air, water, wastewater, or hazardous waste permits.

Executive Order 13514. This EO, *Federal Leadership in Environmental, Energy, and Economic Performance*, was signed by President Obama on October 5, 2009. EO 13514 defines three scopes of emissions, which include the following: (i) scope 1: direct GHG emissions from sources that are owned or controlled by the federal agency; (ii) scope 2: direct GHG emissions resulting from the generation of electricity, heat, or steam purchased by a federal agency; and (iii) scope 3: GHG emissions from sources not owned or directly controlled by a federal agency but related to agency activities such as vendor supply chains, delivery services, and employee travel and commuting.

General Conformity. Under 40 CFR Part 93 and the provisions of Part 51, Subchapter C., Chapter I, Title 40, Appendix W of the CFR, of the CAA as amended, federal agencies are required to demonstrate that federal actions conform with the applicable SIP. In order to ensure that federal activities do not hamper local efforts to control air pollution, Section 176(c) of the CAA, 42 U.S.C. 7506(c), prohibits federal agencies, departments, or instrumentalities from engaging in, supporting, providing financial assistance for, licensing, permitting, or approving any action which does not conform to an approved state or federal implementation plan. The provisions of Part 51, Subchapter C, Chapter I, Title 40, of the CFR, went in effect December 27, 1993.

The U.S. EPA general conformity rule applies to federal actions occurring in non-attainment or maintenance areas. Because Santa Barbara County is an unclassified/attainment area for all NAAQS, the General Conformity Rule does not apply to the Proposed Action.

3.1.4 Local Requirements

As indicated previously, in Santa Barbara County, the SBCAPCD is the agency responsible for the administration of federal and state air quality laws, regulations, and policies. Included in the local air districts' tasks are monitoring of air pollution, maintenance of air quality standards through programs to control air pollutant emissions, and the promulgation of rules and regulations.

SBCAPCD regulations require that facilities building, altering, or replacing stationary equipment that may emit air pollutants, to obtain an Authority to Construct permit. Further, SBCAPCD regulations require stationary sources of air pollutants to obtain a Permit to Operate. The local air districts are responsible for the review of applications and for the approval and issuance of these permits. In addition, the SBCAPCD regulations require stationary sources that would emit 25 tons per year or more of any pollutant except CO in any calendar year during construction to obtain emission offsets.

3.2 Biological Resources

Federal agencies are required by section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), to assess the effect of any project on federally listed threatened and endangered species. Under section 7, consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries Service) is required for federal projects if such actions could directly or indirectly affect listed species (threatened, endangered, rare, or candidate) or destroy or adversely modify critical habitat. It is also Air Force policy to consider listed and special status species recognized by state agencies when evaluating the impacts of a project.

Biological resources on VAFB are abundant and diverse because the Base is within an ecological transition zone, where the northern and southern ranges of many species overlap, and because the majority of the land within its boundaries has remained undeveloped. Fourteen major vegetation types have been described and mapped on VAFB (VAFB *In Progress*), which provide habitat for many federal and state listed threatened, endangered, and special concern plant and animal species.

3.2.1 Methodology

General biological surveys at the Proposed Action site (including a 70-foot buffer around the entire site except for its boundary with Hwy 1; and a 50-foot buffer along the utility corridor) were conducted in May, August, and October 2008 (Tetra Tech 2009a). In addition, a Gaviota tarplant (*Deinandra increscens* ssp. *villosa*) survey was conducted in August of 2008 (Tetra Tech 2009b). Additionally, ManTech SRS Technologies, Inc. (MSRS) conducted a complete biological and special status species survey of this site in August 2009. MSRS surveys consisted of walking meandering transects throughout the proposed site. Seacliff buckwheat stands and vegetation types were mapped using orthographic photographs provided by the 30 SW Geo-Integration Office and a Trimble Geo XT global positioning system (GPS) unit. Vegetation types were assigned based on dominant plant species. Determining the occurrence or potential occurrence of special status species was done through direct observation, the finding of potentially suitable habitat, and by the proximity to known localities. Because these surveys occurred in August, they did not encompass the optimal season (late spring to early summer) for identifying rare and special status plants. Thus, a rare and special status plant survey should be conducted between May and July, prior to the start of construction (see Chapter 4 for further discussion).

Vertebrates occurring within the Proposed Action project area were identified visually, acoustically, and by sign. Additionally, records and reports were reviewed from prior surveys in the area including those detailing general surveys conducted by Tetra Tech (2009a) and Gaviota tarplant surveys conducted by Tetra Tech (2009b). Reports detailing branchiopod surveys (Helm Biological Consulting 2009), the wetland delineation (LSA 2009), prior reptile and amphibian surveys (Christopher 1996) and California Natural Diversity Database records were also consulted to assess the potential occurrence of plant, wildlife, and special status species not encountered during the August 2009 surveys.

Delineation of wetlands within the proposed project area was conducted in March and April 2009 (LSA 2009). Wetlands were delineated in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (U.S. Army Corps of Engineers [USACE] 2008), which requires an area to meet specific criteria for each of three wetland parameters (vegetation, hydrology, and soils) to be considered a wetland. Areas exhibiting features potentially indicative of wetlands were evaluated according to routine wetland delineation procedures outlined in the Regional Supplements (USACE 2008).

Where possible, a small sample soil test pit was dug. Vegetation, hydrology, and soils were characterized for each pit, and the results recorded on USACE Wetlands Delineation Forms. The locations of soil test pits were documented on field maps.

The USACE also has jurisdiction over Waters of the U.S. Under Rapanos v. United States, Waters of the U.S. include traditional navigable waters, adjacent wetlands, relatively permanent tributaries (generally flow for at least 3 months) and wetlands adjacent to relatively permanent tributaries. Jurisdiction of these waters extends to the Ordinary High Water Mark. Swales or erosional features with irregular short duration flow and ditches excavated in and draining uplands are generally not jurisdictional unless a significant nexus is present to traditional navigable water (USACE 2007).

3.2.2 Vegetation Types

In addition to areas covered by vegetation, there are many areas within the proposed project area covered by unvegetated surfaces such as pavement or gravel trails. Within the project site there are approximately 2.0 acres of gravel trails, 10.8 acres of pavement, and 0.3 acre of concrete lined drainage ditches. Vegetation types are described in detail below. Where suitable, nomenclature follows Holland (1986). Plant species nomenclature follows Hickman (1993). Table 3-3 provides acreages of each vegetation type within the proposed project area.

Non-native Grassland

This vegetation type occurs most commonly in areas subjected to prior disturbance, allowing weedy non-native species adapted to frequent disturbance to invade and dominate a site. Annual grasses (*Bromus* and *Avena* spp.) and veldt grass (*Ehrharta calycina*) dominate the non-native grassland. Seacliff buckwheat occurs within this vegetation type near the interface with the central coast scrub. In addition, four of the five pools in which vernal pool fairy shrimp cysts were documented, are dominated by this vegetation type, as are areas of highly ephemeral pooling.

Table 3-3. Vegetation types found within the proposed project area.

Vegetation Type	Acreage
Non-native Grassland	64.7
Burton Mesa Chaparral	8.9
Central Coast Scrub	6.6
Non-native Tree	6.6
Mixed Burton Mesa Chaparral/Non-native Grassland	1.9
Mixed Central Coast Scrub/Non-native Grassland	1.0
Vernal Marsh	0.8
Ruderal	0.7
Arroyo Willow Riparian Forest	0.6

Burton Mesa Chaparral

This is a chaparral vegetation type endemic to the Burton Mesa. It occurs on well-drained sandy soils and is dominated by narrowly distributed manzanitas (*Arctostaphylos* spp.). Most of the component species produce seeds which are highly fire dependent for germination. Burton Mesa Chaparral within the project site is restricted to the utility corridor and is dominated by La Purisima manzanita (*Arctostaphylos purissima*) and sand mesa manzanita (*Arctostaphylos rudis*). Chamise (*Adenostoma fasciculatum*) and coast live oaks (*Quercus agrifolia*) are also common woody components. Clearings are dominated by herbaceous species such as rush rose (*Helianthemum scoparium*).

Burton Mesa chaparral is vulnerable to invasion by exotic species such as iceplant (*Carpobrotus edulis*) and jubata grass (*Cortaderia jubata*), resulting in a mixed Burton Mesa chaparral/non-native grassland. These invaders are adept at colonizing disturbed areas and invading adjacent intact habitats resulting in the displacement of native vegetation.

Central Coast Scrub

This vegetation type is characterized by shallow-rooted, mesophylic plant species that

are often drought-deciduous and summer-dormant. The dominant native species at this site are coyote brush (*Baccharis pilularis*), California sagebrush (*Artemisia californica*), and black sage *(Salvia mellifera*). Scattered coast live oak trees, and seacliff buckwheat (*Eriogonum parvifolium*) are also present within this vegetation type. Portions of the central coast scrub have been subjected to past disturbances resulting in a mixed central coast scrub non-native grassland vegetation type.

Non-native Tree

Extensive growths of non-native trees, primarily eucalyptus (*Eucalyptus* spp.), and Monterey pines (*Pinus radiata*) occur within the project area. The majority of these trees are part of planted windbreaks; others are ornamentals originally planted in association with trailer sites. Some species (eucalyptus and Monterey pines) are successfully reproducing within the project area and expanding their distributions.

Vernal Marsh

For the purposes of this assessment, vernal marshes within the project area consist of those wetland areas meeting the three parameters required to qualify as jurisdictional: hydrophytic vegetation, hydric soils and wetland hydrology. They are dominated by annual or summer deciduous wetland species such as iris-leaved rush *(Juncus xiphoides*). One of the five pools in which vernal pool fairy shrimp cysts were documented qualified as a jurisdictional wetland.

Ruderal

Ruderal vegetation types are found growing adjacent to roads or within areas subjected to frequent disturbance. Ruderal vegetation types within the project site are dominated by low growing annual forbs and grasses, most of which are non-native. Within the project site ruderal vegetation types are found on the shoulder abutting Hwy 1.

Arroyo Willow Riparian Forest

Central Coast Arroyo Willow Riparian Forest is a dense, low, closed-canopy, broad-leafed, winter-deciduous riparian forest dominated by arroyo willow (*Salix lasiolepis*), which can grow as a tree or a treelike shrub. Within the proposed project area, this vegetation type is associated with both natural and artificial drainage channels. A total of approximately 0.5 acre qualify as jurisdictional wetland (LSA 2009).

3.2.3 Wildlife Species

The vast majority of the proposed project area is dominated by non-native grassland (64.7 acres) with central coast scrub (6.6 acres) and Burton Mesa chaparral (8.9 acres) being the next most common vegetation types. These vegetation types provide habitat for a variety of vertebrate species.

Birds commonly associated with vegetation types within the project site include house finch (*Carpodacus mexicanus*), European starling (*Sturnus vulgaris*), and western scrub-jay (*Aphelocoma californica*), which were frequently observed during field surveys. Also observed using the project site were western kingbird (*Tyrannus verticalis*) and western bluebird (*Sialia mexicana*), both of which were present with fledglings during August field surveys.

Pacific treefrog (*Pseudacris regilla*) are likely to be the most common amphibian species within the proposed project area; western toad (*Bufo boreas*), and lungless salamanders such as the ensatina (*Ensatina eschscholtzii*) and the arboreal salamander (*Aneides lugubris*) would also be expected to occur.

Reptile species observed and expected within the project area include western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), side-blotched lizard (*Uta stansburiana*), western skink (*Eumeces skiltonianus*), San Diego gopher snake (Pituophis catenifer annectens) and southern pacific rattlesnake (*Crotalus helleri*).

A variety of mammal species was also observed or is expected to occur within the project area. These include brush rabbit (*Sylvilagus bachmani*), long-tailed weasel (*Mustela frenata*), coyote (*Canis latrans*), and black-tailed deer (*Odocoileus hemionus*). Small mammals include various species of mice (*Peromyscus* spp.), and Botta's pocket gopher (*Thomomys bottae*).

3.2.4 Special Status Species

Table 3-4 lists federal and state threatened and endangered species and other special status species that occur or have the potential to occur within the proposed project area and its vicinity. Brief accounts for each special status species follow below. A Biological Assessment was completed and submitted to the USFWS for section 7 consultation under the ESA. The USFWS issued a Biological Opinion (8-8-10-F-15; available upon request) whereby it determined that the Proposed Action would not jeopardize the continued existence of three affected federally threatened and endangered species. The USFWS also issued an Incidental Take Statement as part of the Biological Opinion, which includes a requirement to comply with reasonably prudent measures and terms and conditions to minimize adverse effects on protected species, as well as for compensating for loss of habitat (see Section 4.2).

Several species were excluded from potential occurrence because they either do not occur at the site during the time project activities are scheduled to start, they do not breed within the proposed project area and their special status affords them protection only during their breeding period, or they do not occur in the form that affords them special status protection (i.e., rookeries or nesting colonies).

Federally Listed Species

Vernal Pool Fairy Shrimp

Federally threatened vernal pool fairy shrimp require cold winter water temperatures to hatch and grow and typically appear after the first frosts. Pools must dry completely during the summer months to prevent fungus from destroying cysts. In addition to natural pools, these fairy shrimp can also occupy artificial habitats such as road side ditches, ruts left by heavy construction vehicles, and depressions in fire breaks (Eng et al. 1990, Rogers and Fugate 2001).

In 2004 through 2006, vernal pool fairy shrimp were documented in 151 pools on VAFB comprising approximately 82 acres of occupied habitat (SRS Technologies 2006). Surveys conducted by Helm in 2008 through 2009 for this project documented vernal pool fairy shrimp in an additional five pools comprising 0.07 acre (Helm Biological Consulting 2009). In September 2009, fire suppression efforts led to the destruction of two of the pools (0.02 acre) within the proposed project area.

Critical habitat for the species was designated August 6, 2003 (68 Federal Register [FR] 46684; USFWS 2003). However, because vernal pool fairy shrimp had not been documented on VAFB at this point, the Base was not considered in the designation. As a result, the proposed project does not affect critical habitat.

El Segundo Blue Butterfly

The federally endangered El Segundo blue butterfly (*Euphilotes battoides allyni*) occurs in coastal dune scrub, along coastal bluffs, and in central coastal scrub. The adult flight period (June-September) coincides with the blooming period of its host plant, seacliff buckwheat (Arnold 1978, 1983; Pratt and Ballmer 1993). Eggs are deposited on buckwheat flowers and buds where the larvae feed until maturation. Upon maturation larvae burrow into the soil and pupate, usually within the root and debris zone of the host plant (Mattoni 1992; Pratt and Ballmer, pers. obs.). Pupae remain in diapause until at least the following flight season. The number of adult butterflies that emerge in a given year is dependent on environmental conditions. The majority of the pupae may remain in diapause if environmental conditions are not favorable (Pratt and Ballmer 1993).

The proposed project area was surveyed twice for El Segundo blue butterflies during

Table 3-4. Special status plant and wildlife species within the proposed project area.

Scientific Name **Common Name**	**Status**		**Occurrence**	**Habitat**	**Comments**
	USFWS[1]	**CDFG[2]**			
Invertebrates					
Branchinecta lynchi Vernal pool fairy shrimp	FT		Documented	Vernal pools and areas of ephemeral water	Activity corresponds to inundation of pools
Euphilotes battoides allyni El Segundo blue butterfly	FE		Potential	Occurrence is tied to its host plant, seacliff buckwheat	Adult flight period June – September
Amphibians					
Spea hammondii Western spadefoot		SSC	Potential	Lowlands with open vegetation and slow streams or temporary pools	Breeds January – May
Rana draytonii California red-legged frog	FT	SSC	Potential	Chiefly associated with perennial ponds, streams	Breeds November – April
Reptiles					
Phrynosoma coronatum Coast horned lizard		SSC	Potential	Open grasslands and shrublands with loose sandy soils	Active year round
Anniella pulchra pulchra Silvery legless lizard		SSC	Potential	Grasslands, shrublands, and woodlands with loose sandy soils	Active year round
Birds					
Aquila chrysaetos (non-breeding/wintering) Golden eagle	BGEPA		Potential	Forages over grasslands and open woodlands, nest in local mountains	Breeds January - August
Selasphorus sasin Allen's hummingbird	BCC		Potential	Forages within grasslands, shrublands, and woodlands; nest in shrubs and trees	Breeds February - August
Picoides nuttallii Nuttall's woodpecker	BCC		Documented	Forage and nest within woodland habitats	Breeds March - August
Lanius ludovicianus Loggerhead shrike	BCC	SSC	Documented	Forage over all open habitats, breed in shrubs or trees	Breeds March - August
Baeolophus inornatus Oak titmouse	BCC		Documented	Forage and nest in oak woodland	Breeds March - August
Dendroica petechia Yellow warbler	BCC		Potential	Forage and nest in riparian woodlands	Breeds March - August
Agelaius tricolor Tricolored blackbird	BCC	SSC	Potential	Forage in grasslands and agricultural fields; nest in densely vegetated wetlands	Breeds March - August
Carduelis lawrencei Lawrence's goldfinch	BCC		Potential	Feed, forage, and nest in open woodlands, scrublands, and weedy fields	Breeds March - August
Mammals					
Taxidea taxus American badger		SSC	Documented	Co-occur with small fossorial mammals (gophers and ground squirrels)	Active year round

NOTES:
1 FE = Federal Endangered Species FT = Federal Threatened Species BGEPA = Bald and Golden Eagle Protection Act
BCC = Federal Bird of Conservation Concern
2 CDFG = California Department of Fish and Game SSC = California Species of Special Concern

the 2009 adult flight season; no butterflies were documented. Based on 2009 surveys, the project site is approximately 6 miles from the nearest documented occurrence of the El Segundo blue butterfly on VAFB.

The USFWS proposed critical habitat for the species in 1977 (42 FR 7972; USFWS 1977). This proposal pre-dated the discovery of the species on VAFB. Consequently VAFB and the proposed project area are not within proposed critical habitat.

California Red-legged Frog

The California red-legged frog (*Rana draytonii*), a highly aquatic federally threatened amphibian, inhabits quiet pools of streams, marshes, and occasionally ponds. It prefers shorelines with extensive vegetation. It is active year-round in coastal areas, and can be found in upland areas during the winter and early spring. Breeding can take place from November through April with most egg deposition occurring in March. California red-legged frogs have been documented traveling distances of over 1 mile during the wet season and spending considerable time in riparian vegetation, out of water. It is believed that riparian vegetation provides good foraging habitat, as well as good dispersal corridors due to canopy cover and the presence of moisture (USFWS 2002). The nearest documented occurrence of California red-legged frogs is approximately 0.69 mile from the project area (Tetra Tech 2003).

The USFWS published proposed revisions to California red-legged frog critical habitat in September 16, 2008 (73 FR 53491; USFWS 2008). The proposed project area does not fall within proposed critical habitat. Riparian, wetland, and seasonal pools within the proposed project area provide potential upland habitat for this species.

Other Special Status Species

Special Status Plants

Special status plant species considered include the federally endangered Gaviota tarplant, and Lompoc yerba santa (*Eriodictyon capitatum*). These species have not been documented within the proposed project area in the past. A Gaviota tarplant survey conducted in August 2008 (Tetra Tech 2009b) did not document the presence of the species at the site.

Special Status Amphibians

Western spadefoot (*Spea hammondii*) is a California species of special concern with potential to occur within the project site. Spadefoots have been documented on VAFB, where they breed in ephemeral pools after they are filled by winter rains. The seasonal pools and wetlands in the project area constitute potential breeding habitat for this species.

Special Status Reptiles

Two reptiles designated California species of special concern have potential to occur in the proposed project area: the coast horned lizard (*Phrynosoma coronatum*) and silvery legless lizard (*Anniella pulchra pulchra*). These species are typically found in areas with loose sandy soil. Coast horned lizards are often found on the surface within openings in Burton Mesa chaparral and central coast scrub vegetation types. Silvery legless lizards are fossorial and may be found within any vegetation type where the soil is conducive to burrowing. The project area provides potential breeding and foraging habitat for both species.

Special Status Birds

Eight special status bird species have the potential to occur in the proposed project area including the golden eagle (federally protected under the Bald and Golden Eagle Protection Act of 1940). The project site provides year-round foraging habitat for golden eagles.

The remaining seven species, Allen's hummingbird (*Selasphorus sasin*), Nuttall's woodpecker (*Picoides nuttallii*), loggerhead shrike (*Lanius ludovicianus*), oak titmouse (*Baeolophus inornatus*), yellow warbler (*Dendroica petechia*), tricolored blackbird (*Agelaius tricolor*), and Lawrence's goldfinch (*Carduelis* lawrencei) are all federal Birds of Conservation Concern. The loggerhead shrike and tricolored blackbird are also

California species of special concern. The project area provides suitable foraging habitat for all species. In addition it supplies potential nesting habitat for Allen's hummingbird, loggerhead shrike, oak titmouse, and Lawrence's goldfinch. Yellow warblers typically prefer to nest in larger tracts of riparian forest than are present within the proposed project area. Tricolored blackbirds nest colonially in large stands of monocots surrounding ponds and streams; however, transient and wintering individuals may use the project area for foraging.

Special Status Mammals

One mammal, the American badger (*Taxidea taxus*), designated a California species of special concern, has potential to occur and has been documented within the project site. Badgers are widespread on VAFB within non-native grassland vegetation (MSRS field notes) where they prey largely on small fossorial mammals. Badger sign within the project area was not fresh and highly localized; however, the proposed project area provides breeding and foraging habitat for the species.

Other Species Considered

Vandenberg monkey flower (*Mimulus fremontii* var. *vandenbergensis*) is a spring blooming (April-June) annual species. It is endemic to the Lompoc-Vandenberg area. It is found chiefly in sandy soils in openings within Burton Mesa chaparral habitat. It has not been documented within the proposed project area, but specific surveys were not conducted for it. Due to its diminutive size and ephemeral nature it could easily be missed during a general survey. Within the proposed project area, it would be most likely to occur within the utility corridor. The species has been documented 0.34 mile from the project site, in the vicinity of Pine Canyon Lakes.

3.2.5 Waters of the United States and Wetlands

For the wetland hydrology criterion to be met, a site must be inundated or saturated or exhibit features that show the area was inundated or saturated for the required period of time (i.e., 45 days). Waters of the U.S. encompass navigable waters bound by the ordinary high water mark and adjacent wetlands, and relatively permanent tributaries.

A wetlands assessment was completed within the Proposed Action project area from February through April 2008 (LSA 2009). A total of 1.34 acres of wetlands were identified within the project area. Waters of the U.S. are not present within the proposed project area.

3.3 Cultural Resources

The Proposed Action site is on a landform on north VAFB known as Burton Mesa. Burton Mesa is a large uplifted marine terrace with wind-reworked Pleistocene fluvial sands overlying Miocene-age Monterey shale. Due to early Holocene aeolian processes, landforms and soils in this area are polygenetic in origin, resulting in landforms and soils of disparate ages set in close spatial proximity (Lebow 1997).

3.3.1 Archaeological Sensitivity

The VAFB area has a long history of human occupation and land use. The 71-acre parcel for the proposed project area and the associated waterline corridor, is considered to have low archaeological sensitivity based on geographic location and prior land use.

Archaeological surveys reveal a clear pattern of prehistoric use on the edge of the mesa and in mesa canyons on this portion of Burton Mesa. Due to the geology of the mesa, erosion along the terrace has exposed chert outcrops and cobbles that were exploited by prehistoric residents for tool manufacture. Conversely, few sites are present away from the mesa edge. The proposed project area under the Proposed Action is roughly 250 to 400 meters from the edge of Lake Canyon; it is on the relatively flat mesa top and thus away from the more archaeologically sensitive mesa edge. Further, Lebow and Moratto's

(2005) assessment of site density on north VAFB found that Burton Mesa had fewer sites compared to other areas on VAFB. They concluded that Burton Mesa was not extensively used by the prehistoric residents of this region.

At the Proposed Action site, modern development of the property as an unused launch facility and a trailer park has left the area disturbed. This proposed project area was used as open range land until 1960. At that time the property was graded for construction of launch pads for the Boeing and Michigan Aerospace Research Test Center. Work on this launch facility was halted in 1960 after initial grading had taken place (Geiger 2006; Prichard 2006). In 1965, construction of a trailer park by Arthur Evans Company of Lompoc began (Geiger 2006). The trailer park consisted of 172 units along with support buildings and infrastructure such as paved concrete and asphalt roads, concrete pads, mailboxes, a water tower, a sewage station, and storm drains.

3.3.2 Archaeological Resources in the Vicinity

An archaeological study area was established that included the 71-acre Proposed Action site, as well as a 50-foot wide buffer around the parcel. The study area also included the waterline corridor plus 15 feet on either side of the waterline. Together, the archaeological study area encompassed 72 acres.

An archaeological site record and background literature search was conducted in two phases for the proposed project area. Tetra Tech, Inc. conducted a records search at the Central Coast Information Center, University of California Santa Barbara (UCSB) in February 2008 using a 0.5-mile radius for archaeological site records and previous projects. Applied EarthWorks staff examined maps, site records, and previous reports housed at the 30th Civil Engineer Squadron Asset Management Flight, Environmental Conservation (30 CES/CEANC) on VAFB as well as layers from the Base Comprehensive Plan Geographic Information System (GIS).

Previous Studies

Background research identified 11 prior cultural resources studies in the vicinity of the Proposed Action study area (Table 3-5). Combined, the basewide survey (Carbone and Mason 1998) and the survey of the cantonment area (Lebow and Peterson 2008) covered nearly the entire study area. The only area not previously surveyed was a small segment of the waterline on the northern side of Hwy 1; that area was examined on May 14, 2009 as part of the Section 106 compliance effort for the CSC project (Enright and Lebow 2009). No cultural resources were identified during that survey.

3.3.3 Recorded Cultural Resources

The background literature search revealed 21 previously known archaeological sites and seven isolated artifacts (Table 3-6). Most of the sites were identified as lithic scatters or quarry sites. Of the 21 identified sites and seven isolated artifacts, only isolated artifact VAFB-ISO-740 was recorded within the archaeological study area (i.e., the actual 71-acre Proposed Action site and the 50-foot buffer). No sites or isolated artifacts were within or adjacent to the proposed waterline.

According to the isolate record for VAFB-ISO-740, the artifact is a secondary flake. No other information regarding material type, size, or artifact description is recorded on the VAFB Primary Record form. It was recorded by Chambers Group and is cited in the Chambers Group and Science Applications International Corporation (Carbone and Mason 1998) basewide cultural resources inventory report.

Applied EarthWorks examined the location of VAFB-ISO-740 in January 2009 as part of the Section 106 compliance for the CSC project and found no evidence of the flake (Enright and Lebow 2009). To locate VAFB-ISO-740 in the field, its plotted location in the VAFB GIS was downloaded to a hand held GPS unit (a Trimble GeoXT with submeter accuracy). The artifact was recorded just off an old gravel road with a set of shallow berms on both sides of the road. Road gravels are

Table 3-5. Previous archaeological studies within 0.25 mile of the Proposed Action study area.

Author	VAFB No.	Report Title
Van Horn (1979)	—	An Overview of Potential Impacts to Cultural Resources Resulting from Proposed Alternative Transmission Lines Serving the LNG Facility at Point Conception, California
WESTEC Service, Inc. (1981)	1981-04	Union Oil Co. of California, Geophysical Evaluation, Vandenberg Air Force Base, Santa Barbara County, CA., Environmental Resources Survey
WESTEC Service, Inc. (1982)	1982-10	Union Oil Co of California, Seismic Test Monitoring Program, Vandenberg Air Force Base, Santa Barbara County, California: Cultural and Biological Resources
Waldron (1988)	—	Caltrans Proposes to Widen and Rehabilitate the Pavement on Highway 1 from Vandenberg Road to Constellation Road
Woodman et al. (1991)	1991-06	Western Chumash Prehistory: Resource Use and Settlement in the Santa Ynez River Valley
Peter and Dondero (1991)	1991-07	Site Summaries and Technical Appendices. In Western Chumash Prehistory: Resource Use and Settlement in the Santa Ynez River Valley
SAIC (1994)	1994-05	Archaeological Survey Report, Capehart Military Family Housing Multipurpose Trail, Vandenberg Air Force Base, Santa Barbara County, California.
Price et al. (1996)	1996-03	Cultural Resource Investigations for the Military Family Housing Project, Vandenberg Air Force Base, Santa Barbara, California.
Carbone and Mason (1998)	1998-03	Phase I, II, and III Archaeological Surveys for Cultural Resources Inventory, Vandenberg Air Force Base, Santa Barbara County, California
Hodges et al. (2000)	2000-04	Archaeological Survey of the Azalea and Halloween Wildfire Areas on North Vandenberg Air Force Base, Santa Barbara County, California
Lebow and Peterson (2008)	—	Archaeological Survey of the Vandenberg Air Force Base Cantonment Area, Santa Barbara County, California

Table 3-6. Previously recorded sites and isolated artifacts within 0.25 mile of the Proposed Action study area.

Sites					
CA-SBA-1760	CA-SBA-2376	CA-SBA-2378	CA-SBA-3074	CA-SBA-3075	CA-SBA-3076
CA-SBA-3077	CA-SBA-3078	CA-SBA-3079	CA-SBA-3080	CA-SBA-3081	CA-SBA-3082
CA-SBA-3083	CA-SBA-3084	CA-SBA-3085	CA-SBA-3086	CA-SBA-3251/H	CA-SBA-3258
CA-SBA-3261	CA-SBA-3263	CA-SBA-3584			
Isolated Artifacts					
VAFB-ISO-200	VAFB-ISO-228	VAFB-ISO-595	VAFB-ISO-734	**VAFB-ISO-740***	VAFB-ISO-741
VAFB-ISO-742					

* Within the 71-acre CSC site.

angular, ranged in size from 0.5 to 6.0 centimeters, and are cherty. It is likely that the recorded isolated artifact was, in fact, road gravel. Besides the shallow berms, the landscape in the proposed project area is generally flat with surface vegetation consisting of brush, grasses, and shrubs.

To ensure that the isolated artifact did not represent an archaeological site, four shovel test pits were excavated in the immediate vicinity of the artifact's plotted location. Each shovel test pit was 50 centimeters in diameter and was excavated in 20-centimeter levels to a depth of 60 centimeters. All excavated material was dry screened through 1/8-inch

mesh. All four probes were negative, indicating that VAFB-ISO-740 does not represent an archaeological site (Enright and Lebow 2009).

3.4 Earth Resources

3.4.1 Geology and Soils

VAFB is a geologically complex area that includes the transition zone between the Southern Coast Range and Western Transverse Range geomorphic provinces of California. The geologic features of VAFB have been an important factor in the development of the diverse natural habitats found in this primarily undeveloped stretch of California coastline. VAFB is underlain predominantly by marine sedimentary rocks of Late Mesozoic age (140 to 70 million years before the present) and Cenozoic age (70 million years before the present). The basal unit underlying the entire base is the Franciscan Formation of upper Jurassic age (Dibblee 1950). The Franciscan Formation consists of a series of sedimentary and volcanic rocks with numerous serpentine intrusions. Extensive folding and faulting throughout the VAFB area has created four structural regions: the Santa Ynez range, the Lompoc lowland, the Los Alamos syncline, and the San Rafael Mountain uplift (Reynolds et al. 1985). The Santa Ynez range consists of a very thick Cretaceous-Tertiary sedimentary section uplifted along the Santa Ynez fault; it was then subsequently folded. The Lompoc lowland is an area of low relief that is structurally synclinal but has Franciscan basement relatively close to the surface. The Los Alamos syncline is a deep structural down warp traversing the Los Alamos and upper Santa Ynez valleys. Faulting along the southwestern margin of the mountain range uplifted the San Rafael Mountains. The majority of the folds in these structural regions are oriented to the northwest.

Geology in the area of VAFB where the Proposed Action site is located consists of late Miocene Sisquoc Formation overlain with an unconformable veneer of Pleistocene marine terrace deposits known as Orcutt Sand (Dibblee 1988). The late Miocene Sisquoc Formation is a marine deposited punky, diatomaceous claystone, clayey diatomite, and siliceous clay shale (Dibblee 1988).

At the Proposed Action site, there is gradational contact between the Monterey and overlying Sisquoc Formation, which is not known to contain significant groundwater (Tetra Tech 2006). Orcutt Sand is present on the site surface, and is derived from unconsolidated, windblown fine sands and silts interspersed with clay. It forms a mantle that is approximately 30-feet thick throughout the Base main cantonment area of Burton Mesa and thins toward the east near drainages to a veneer of less than 10 feet (Dibblee 1988). Orcutt Sand observed at the site consisted of a tan to rusty brown, friable to locally indurated wind deposited sand with pebble-sized iron oxide nodules (Tetra Tech 2006). Based on borings drilled in Orcutt Sand in the Base main cantonment, discontinuous lenses of clay and gravelly sand are present within the unconsolidated layer (Tetra Tech 2006). Soils on Burton Mesa at the site consist of Tangair Sand (Environmental Data Resources, Inc. 2006), which is associated with slow infiltration rates and poor drainage (Tetra Tech 2006).

The Proposed Action site is not expected to be prone to landslides. The site is mostly flat, and not near waterways or hills that could contribute to landslides.

3.4.2 Seismology

The Santa Barbara County region is seismically active with a major earthquake occurring in the region about every 15 to 20 years (USAF 1987, Alterman et al. 1994). The Santa Ynez-Pacifico Fault Zone, the Lompoc-Solvang (Santa Ynez River)-Honda Fault Zone, the Lions Head-Los Alamos-Baseline Fault Zones, and their potential offshore extensions, are three of the primary

fault zones that project through VAFB (Alterman et al 1994).

These fault systems within the Transverse Ranges are considered active (Jennings 1994) and capable of generating damaging earthquakes. Moderate or major earthquakes along these systems could generate strong or intense ground motions in the area, and possibly result in surface ruptures of unmapped faults along the northern and southern boundaries, as well as the central part of VAFB.

3.4.3 Geological Hazards

The proposed project area is located in a seismically active portion of central California. Potential hazards that could affect the site and result in structural damage include faulting, ground shaking, liquefaction, lateral spreading and flooding. The hazards consist of seismically induced settlement, and collapse (hydroconsolidation) potential.

The potential for surface fault rupture on VAFB is generally considered to be low (USAF 1987). At the present, there are no known areas where liquefaction has occurred. Areas most prone to liquefaction are those in which there is sandy to silty soil, the water table is within 50 feet of the surface, and earthquake loading exceeds 20 percent of gravity. The areas most prone to liquefaction on VAFB are near San Antonio Creek and the Santa Ynez River. The potential for liquefaction on VAFB, despite these areas, is still considered low (USAF 1987).

3.5 Hazardous Materials and Waste Management

Hazardous materials and wastes are those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act (42 U.S.C. 9601-9675); the Toxic Substances Control Act (15 U.S.C. 2601-2671); the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA; 42 U.S.C. 6901-6992); and as defined in the State of California corresponding laws and regulations. In addition, federal and state Occupational Safety and Health Administration (OSHA) regulations govern protection of personnel in the workplace. In general, the definitions within the citations include substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health and welfare, to workers, or to the environment.

3.5.1 Hazardous Materials Management

Management of hazardous materials used during the construction and operation of the CSC would be the responsibility of the CSA and would follow procedures as documented in the CSA CSC Hazardous Materials Management Plan (CSA 2009b). The CSA would maintain inventories of hazardous materials. All chemicals would be reviewed and approved by the CSA prior to their use at the site. Before authorizing the use of hazardous materials, the CSA would ensure a copy of the Material Safety Data Sheet is available, and verify that the material is suitable for use at the CSC site. By providing handling and use information, the CSA would control the potential misuse of hazardous materials, maintain an accounting of the types of hazardous materials used at the CSC site, and accomplish usage and emissions reports as required by federal, state, and local environmental regulations. Users of hazardous materials must also comply with California Business Plan requirements. Hazardous materials used during construction activities would include petroleum, oil, and lubricants (POLs) in equipment and vehicles. Once the CSC is operational, hazardous materials used on site would be typical of office and school environments. In addition, an equipment assembly capability is planned at the CSC. Examples of hazardous materials anticipated to be associated with assembly operations include:

- Solvents – Isopropyl alcohol (IPA), Methyl ethyl ketone (MEK), acetone
- Epoxies and adhesives
- Primers
- Liquid Nitrogen – maximum of two tanks at 1,500 gallons each

3.5.2 Hazardous Waste Management

Management of hazardous waste at the CSC would comply with the RCRA Subtitle C (40 CFR Part 240-299) and with California Hazardous Waste Control Laws as administered by the California EPA, Department of Toxic Substances Control, under Title 22, Division 4.5 of the CCR. These regulations require that hazardous wastes be handled, stored, transported, disposed of, or recycled according to defined procedures.

The CSA and its contractors generating hazardous wastes would be required to follow federal, state, and local laws and regulations. Because the Proposed Action is not a government action, use of the Air Force Generator Identification (ID) Number would not be allowed. The CSA and its contractors that anticipate generating hazardous wastes would need to obtain either a U.S. EPA ID Number or a California ID Number, depending on the amounts and types of waste produced. The CSA and its contractors would be required to comply with all laws regulating the generation, storage, transportation, and disposal of hazardous waste. Hazardous waste would be removed from the CSC site under hazardous waste manifest and transferred off site in properly labeled Department of Transportation approved containers from its point of origin to a permitted offsite treatment storage or disposal facility.

3.5.3 Installation Restoration Program

The Federal IRP was implemented at Department of Defense facilities to identify, characterize, and restore hazardous substance release sites. There are currently 136 IRP sites throughout VAFB grouped into six Operable Units based on similarity of their characteristics.

IRP sites are remediated through the Federal Facilities Site Remediation Agreement, a working agreement between the USAF, the Central Coast RWQCB, and the Department of Toxic Substances Control. In addition to IRP sites, there are identified Areas of Concern (AOCs), where potential hazardous material releases are suspected; and Areas of Interest (AOIs), defined as areas with the potential for use and/or presence of a hazardous substance. Various contaminants could be present at these sites including trichloroethylene, polychlorinated biphenyls, volatile organic compounds (VOCs), total petroleum hydrocarbons, asbestos, and other hazardous contaminants. No IRP sites, AOCs or AOIs have been identified within the Proposed Action site.

3.6 Human Health and Safety

The affected environment for Human Health and Safety includes the regulatory environment for health and safety issues established to minimize or eliminate potential risk to the general public and personnel involved in the construction and operation of the CSC under the Proposed Action.

3.6.1 Worker Safety

Relevant health and safety requirements include industrial hygiene and ground safety. Industrial hygiene and ground safety would be the responsibility of the CSA contractor safety department. Industrial hygiene responsibilities include monitoring of exposure to workplace chemicals and physical hazards, hearing and respiratory protection, medical monitoring of workers subject to chemical exposures, and oversight of all hazardous or potentially hazardous operations. Ground safety responsibilities include protection from hazardous situations and hazardous materials. All construction activities and facility operations and maintenance are subject to federal, state, and

local requirements, and the requirements of the federal OSHA.

Hazardous materials, primarily POLs for operating equipment and vehicles, and the materials associated with assembly operations as detailed in Section 3.5.1, would be used under the Proposed Action. The potential exists for unexpected releases of these materials, which would generate hazardous waste. Therefore, the potential exists for persons participating in project activities to become exposed to hazardous materials and hazardous waste. In addition, the following physical features have the potential to be present in the vicinity of proposed project area, and have the potential to adversely impact the health and safety of site workers:

- Physical hazards including traffic on the roads, holes and ditches, uneven terrain, sharp or protruding objects, slippery soils or mud, and unstable ground
- Biological hazards such as animals (insects, spiders, and snakes), and disease vectors (ticks and rodents)

3.6.2 Noise

The Noise Control Act (NCA; 42 U.S.C. 4901 et seq.) sought to limit the exposure and disturbance that individuals and communities experience from noise. It focuses on surface transportation and construction sources, particularly near airport environments. The NCA also specifies that performance standards for transportation equipment be established with the assistance of the Department of Transportation. In 1987, the Quiet Community amendment gave state and local authorities greater involvement in controlling noise.

Noise is often defined as unwanted sound that can interfere with normal activities or otherwise diminish the quality of the environment. Depending on the noise level, it has the potential to disrupt sleep, interfere with speech communication, or cause temporary or permanent changes in hearing sensitivity in humans and wildlife. Noise sources can be continuous (e.g., constant noise from traffic or air conditioning units) or transient in nature (e.g., a jet overflight or an explosion). Noise sources also have a broad range of frequency content (pitch) and can be nondescript, such as noise from traffic, or be specific and readily definable, such as a whistle or a horn. The way the acoustic environment is perceived by a receptor (animal or person) is dependent on the hearing capabilities of the receptor at the frequency of the noise, and their perception of the noise (URS Corporation 1986).

The amplitude of sound is described in a unit called the decibel (dB). A-weighting is a standard filter used in acoustics that approximates human hearing and is in some cases the most appropriate weighting filter when investigating the impacts of noise on wildlife as well as humans. Examples of A-weighted noise levels for various common noise sources are shown in Table 3-7.

Existing noise levels on VAFB are generally quite low due to the large areas of undeveloped landscape and relatively sparse noise sources. Background noise levels are primarily driven by wind noise; however, louder noise levels can be found near industrial facilities and transportation routes. Rocket launches and aircraft over-flights create louder intermittent noise levels. On VAFB, general ambient one-hour average sound level measurements (L_{eq1H}) have been found to range from around 35 to 60 dB (Thorson et al. 2001). Most activities associated with the Proposed Action would generate relatively continuous noise, although noise generated during special events such as launch viewing and entertainment activities would be intermittent. Noise levels of typical heavy construction equipment, as would be used under the Proposed Action, are presented in Table 3-8.

3.6.3 Unexploded Ordnance

Several areas on VAFB were used as ordnance training ranges and have the potential to contain unexploded ordnance (UXO). Since ordnance can be found in

Table 3-7. Comparative A-weighted sound levels.

Noise Level (dBA)	Common Noise Levels	
	Indoor	Outdoor
100 – 110	Rock band inside New York subway	Jet flyover at 304 meters
90 – 100	Food blender at one meter	Gas lawnmower at one meter
80 – 90	Garbage disposal at one meter	Diesel truck at 15 meters; noisy urban daytime
70 – 80	Shouting at one meter; vacuum cleaner at three meters	Gas lawnmower at 30 meters
60 – 70	Normal speech at one meter	Commercial area heavy traffic at 100 meters
50 – 60	Large business office; dishwasher next room	
40 – 50	Small theater or large conference room (background)	Quiet urban nighttime
30 - 40	Library (background)	Quiet suburban nighttime
20 - 30	Bedroom at night	Quiet rural nighttime
10 - 20	Broadcast and recording studio (background)	
0 – 10	Threshold of hearing	

dBA = A-weighted decibel.

Table 3-8. Noise levels of heavy construction equipment.

Equipment Item	Maximum Noise Level (dBA) at 15 m (50 ft)	Equipment Item	Maximum Noise Level (dBA) at 15 m (50 ft)
All other equipment > 5 Horsepower	85	Gradall	85
Auger Drill Rig	85	Grader	85
Backhoe	80	Horizontal Boring Hydraulic Jack	80
Bar Bender	80	In-situ Soil Sampling Rig	84
Boring Jack Power Unit	80	Jackhammer	85
Chain Saw	85	Paver	85
Compactor (ground)	80	Pickup Truck	55
Compressor (air)	80	Pneumatic Tools	85
Concrete Batch Plant	83	Pumps	77
Concrete Mixer Truck	85	Rock Drill	85
Concrete Pump	82	Scraper	85
Crane (mobile or stationary)	85	Slurry Plant	78
Dozer	85	Slurry Trenching Machine	82
Dump Truck	84	Soil Mix Drill Rig	80
Excavator	85	Tractor	84
Flat Bed Truck	84	Vacuum Excavator (vac-truck)	85
Front End Loader	80	Vacuum Street Sweeper	80
Generator (25 kVa or less)	70	Vibratory Concrete Mixer	80
Generator (more than 25 kVa)	82	Welder	73

dBA = A-weighted decibel m = meters ft = feet kVa = kilovolt amperes
SOURCE: Commonwealth of Massachusetts, Section 721.560 Construction Noise Control - http://www.nonoise.org/resource/construc/bigdig.htm

several areas on Base, the Explosive Ordnance Disposal (EOD) Flight must coordinate on all ground disturbing projects. According to EOD guidance, if ordnance is found on the site, it should not be disturbed. Workers in the vicinity must be alerted to the danger and directed away from it, and the EOD Flight must be contacted.

3.7 Land Use and Aesthetics

Visual resources and landscape elements on VAFB include natural features such as gently rolling hills, canyons, creeks, sand dunes, and beaches. Manmade features on Base include the airfield, launch pads, residential development, industrial facilities, and other structures typical of a military installation. VAFB accommodates agricultural outleasing as a major land use on Base. At present, 28,296 acres of rangeland are leased for grazing, and 1,661 acres for cropland (VAFB 2007). All grazing land and farmland at VAFB is currently leased to the U.S. Department of Justice, Bureau of Prisons, U.S. Penitentiary in Lompoc.

Visual resource sensitivity is dependent on the type of user, the amount of use, and viewer expectations. Because the mission of VAFB is the development of U.S. space and missile programs, viewers are familiar with the existing manmade features on Base associated with these programs.

Although previously developed, the Proposed Action site as viewed by drivers on Hwy 1, currently appears to be fairly undisturbed. The view from Hwy 1 appears to be that of a natural environment comprised of trees, shrubs, and grass, with the addition of some light poles. The area surrounding the site is characterized by open space. As discussed in Section 1.3, the proposed project area is outside of Base entry control and can be accessed by the general public.

3.8 Socioeconomics

As described in the CSC Economic Impact Study (Productive Impact, LLC 2008), the CSC is expected to have its greatest impact on the counties of Santa Barbara (especially northern Santa Barbara County), where the CSC would be located, and San Luis Obispo, which is physically close to the area. Due to economic drivers in these counties (agriculture, especially wine grapes; exurban tourism; and technology), they have become increasingly integrated economically in recent years (Productive Impact, LLC 2008). Table 3-9 provides 2004 data for these counties.

More specifically, the greatest socioeconomic effects resulting from the proposed project would occur within the communities of Santa Maria and Lompoc, which are the closest communities physically. Population data and trends provided below are summarized from Sperling's Best Places (Fast Forward Inc. 2010), and the California Employment Development Department (EDD; EDD 2010).

As of 2009, the population of Santa Maria was 85,685 residents, representing a 9.41 percent growth rate since 2000. Within the population ages 25 years or over, 11 percent have a Bachelor's degree or higher, and 3.3 percent have a graduate or professional degree. Unemployment, as of December 2009, was 14.4 percent, with recent job growth declining by 0.4 percent. In Lompoc, the population as of 2009 was

Table 3-9. 2004 Santa Barbara and San Luis Obispo county data.

County	Population	Employment	Households	Area (sq miles)	Industries	Income per House	Total Income
San Luis Obispo	254,566	140,078	99,887	2,903,304	266	$81,971	$8,187,822,000
Santa Barbara	401,851	247,310	141,462	2,738	290	$102,453	$14,493,150,000
Total	656,417	387,388	241,349	6,042	326	$93,976 (Average)	$22,680,970,000

Source: Productive Impact, LLC 2008

40,442 residents, a decline of 2.97 percent since 2000. Within the population ages 25 years or over, 13.3 percent have a Bachelor's degree or higher, and 4.4 percent have a graduate or professional degree. Unemployment as of December 2009 was 16.2 percent, with recent job growth declining by 0.4 percent.

The office vacancy rate in 2008 in northern Santa Barbara County was just over 12 percent (UCSB 2009).

3.9 Solid Waste Management

In 1989, the California Integrated Waste Management Act (Assembly Bill 939) mandated a 50 percent reduction in the quantity of solid waste disposed of in California landfills. The 50 percent reduction was to be accomplished by January 1, 2000, and was measured against a 1990 baseline. Solid waste diversion requirements applicable to this EA were enacted through California Senate Bill 1374, *Solid Waste: Construction and Demolition Waste Materials: Diversion Requirements Model Ordinance.* On March 1, 2004, the California Integrated Waste Management Board (CIWMB) promulgated a model ordinance for local agencies to follow for implementing a 50 to 75 percent diversion of construction and demolition (C&D) debris waste materials from landfills. Currently, the local enforcement agency (LEA), the Santa Barbara County Environmental Health Services Division, has not promulgated its final model ordinance. A locally adopted diversion ordinance would affect requirements and operations at the CSML, as it is within the Santa Barbara County wasteshed.

Commercial operations with leased facilities on VAFB do not have access to the Base Landfill, and make their own arrangements for solid waste management. CSA anticipates using the CSML, or another approved facility. The CSML is approximately 290 acres, including 265 acres designated for use as landfill. It includes inactive, active, and borrow areas. Approximately 186 of the 265 available acres are used for refuse disposal. Approximately 118 acres are currently used for landfill. It is estimated to have approximately 1.8 million tons of waste in place, with an estimated waste acceptance design capacity of 346 million cubic feet, or approximately 9.8 million cubic meters.

CSML, which has been in operation since 1955, is a non-hazardous solid waste disposal site with an active landfill gas collection and control system. In general the landfill has been developed from the northwest to the southeast, and the northwest portion of the landfill is active and includes an intermediate cover soil borrow area covering about 79 acres. Landfill operations consist of a fill-and-cover method, using onsite soils to provide daily cover. Based on the current waste acceptance rate, the landfill has sufficient capacity to operate until 2018. CSML receives an annual average of about 300 metric tons of municipal solid waste per day (based on past 3 year's data). It operates under Solid Waste Facility Permit (SWFP) #42-AA-0016, which allows the facility to handle up to 778 metric tons per day or 858 tons per day of waste. The facility includes a recycling program.

CSA would require a minimum 85 percent diversion rate by weight over all for C&D materials generated by these efforts. Inert materials are highly recyclable with proper pre-planning for segregation and onsite management. Steel, non-chemically treated wood, concrete, waste soil, and asphalt generated as a result of demolition actions would be expected to have a diversion rate higher than 85 percent. Typically, such materials are 100 percent divertible with proper planning and practices. CSA would manage C&D materials to the maximum extent possible. Efforts to minimize capacity consumption of off-base Santa Barbara County recyclers would be incorporated into all project planning.

Construction and Demolition Debris

There are different processes established for handling and disposing of C&D debris. Debris from new construction is typically

uncontaminated and is reused or recycled whenever feasible. Material segregation and storage are also less of a problem with new construction than with demolition. Debris from demolition projects is sometimes less amenable to reuse or recycle because, based on facility age, the structure may be painted with lead-based paint, contain asbestos-containing materials, and have treated woods in structural and finishing materials. This debris may have to be managed as hazardous waste. Demolition projects must often overcome cost differentials wherein it may be less expensive to demolish a structure than to deconstruct or dismantle it. Cost differentials between tipping fees and costs associated with reuse or recycling also influence disposal decisions.

Pollution Prevention

The State of California has mandated a reduction in the quantity of solid waste disposed of in landfills. The Pollution Prevention Act (PPA) of 1990 refocused the national approach to environmental protection toward pollution prevention (P2). CSA would implement P2 program elements by following the P2 hierarchy:

- Reduce (source reduction to prevent the creation of wastes)
- Reuse (keep item or material for its intended purpose)
- Recycle (use item or material for some other beneficial purpose)
- Disposal (in an environmentally compliant manner, only as a last resort)

3.10 Transportation

The proposed project area is located on the west side of Hwy 1, approximately 1.4 miles southeast of the VAFB Main Gate, at the intersection with Azalea Lane. Hwy 1 is a north-south route that exists throughout the majority of coastal California. It provides access between VAFB and Lompoc to the south, and Santa Maria to the north. Azalea Lane is one of two proposed access points into the proposed project area and is currently unused and temporarily closed by barricades.

The Traffic Study (ATE 2009) describes the roadways and intersections within the project study area. The roadways and intersections fall within three jurisdictions: Caltrans, the county of Santa Barbara, and the city of Lompoc. The following streets were considered to be the major components in the project's roadway network: Hwy 1, State Route (SR) 246, Vandenberg Road, Casmalia Road, Timber Lane, Azalea Way, Santa Lucia Canyon Road, Hancock Drive, Harris Grade Road, Purisima Road, and Central Avenue. Figure 1 in the Traffic Study (ATE 2009) depicts the roadways and intersections within the study area.

Existing roadway conditions are evaluated based on roadway capacity and traffic volume. The capacity, which reflects the ability of the network to serve the traffic demand of a roadway, depends on the roadway width, number of lanes, intersection control, and other physical factors. Traffic volumes can be reported as the number of vehicles averaged over a daily period (average daily traffic or ADT).

A road's ability to accommodate different volumes of traffic is generally expressed in terms of Level of Service (LOS). The Insitute of Transportation Engineers (ITE; ITE 1982) defines LOS as "a qualitative measure that incorporates the collective factors of speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort, and convenience, and operating costs provided by a highway facility under a particular condition." The LOS scale ranges from A to F, with each level defined by a range of traffic volume to roadway capacity (V/C). LOS A represents the best operating conditions, while an LOS F represents the worst (Table 3-10).

Table 3-10. Conditions for LOS.

LOS Level	Condition
A	Traffic flows at or above the posted speed limit and all motorists have complete mobility between lanes.
B	Traffic slightly more congested than LOS A, but speed remains the same. Some restrictions to maneuverability; motorists may drive side by side limiting lane changes.
C	More congestion than LOS B. Ability to pass or change lanes not always assured. Target for most urban highways and most rural highways. Roads are efficiently close to capacity, and posted speed is maintained.
D	Speeds are somewhat reduced, motorists are restricted by other cars and trucks. Equivalent to a functional urban highway during commuting hours. Common goal for urban streets during peak hours.
E	Flow becomes irregular and speed varies rapidly without reaching posted limits. Consistent with a road at or approaching its designated capacity.
F	Lowest measure of efficiency. Flow is forced, with all vehicles restricted by those in front; frequent slowing required. This is a road in a constant traffic jam.

Existing LOS for Affected Roadways and Intersections

The existing LOS for portions of Hwy 1 within the project area (i.e. north of the VAFB Main Gate and from the VAFB Main Gate to the Harris Grade Road) varied between LOS A and B depending on north/south direction and morning and afternoon peak hours. The affected portions of SR 246 (i.e. east of Purisima Road) had an LOS D, regardless of these variables. Existing LOS for Santa Barbara County roadways in the project area, which included Santa Lucia Canyon Road south of Hwy 1, Harris Grade Road north of Hwy 1, and Purisima Road north of Hwy 1, all operated at a LOS A.

Traffic flow on roadways is most constrained at intersections; therefore a detailed analysis at critical intersections during peak travel periods is necessary. The following LOS levels were found for the affected intersections.

Intersections operating at an LOS A in both morning and afternoon peak hours included:

- Hwy 1/Timber Lane
- Hwy 1/Hancock Drive

Intersections operating at an LOS C in both morning and afternoon peak hours included:

- Hwy 1/Santa Lucia Canyon Road
- Hwy 1/Harris Grade Road/Purisima Road
- H Street/Central Avenue
- SR 246/Purisima Road

Lastly, the intersection at Hwy 1/Vandenberg Road/Camalia Road operated at a LOS C during morning peak hours, but at an LOS D during afternoon peak hours.

Access to Project Site

The main entrance to the CSC under the Proposed Action would be located at the northeast corner of the site at the intersection of Azalea Lane and Hwy 1, as previously described under the Proposed Action. Hwy 1 at the proposed project area is comprised of two lanes in each direction, with a median divider that breaks in front of Azalea Lane to allow for access from the northbound lanes. The existing intersection is controlled with a stop sign on the Azalea Way approach. During construction, this entrance would be used for construction traffic. Once CSC operations commenced, this entrance would also serve visitors, missions support staff, and service and emergency traffic.

A second entrance, which would be limited to right-turns to and from Hwy 1, is proposed on Hwy 1, further south of the CSC main entrance. This second driveway would serve visitors, mission support staff, service and emergency traffic, and would also be used as a second exit for visitor traffic on launch days or for other large events.

Construction Trucks Haul Routes

The construction of the CSC would require some demolition activities, mainly accomplished during Phase 0. Demolition materials that could not be reused on site would be loaded onto trucks and hauled to the CSML, or another approved facility in accordance with approved traffic control and haul route plans. Truck traffic associated with

the proposed project would likely use northbound Hwy 1 to West Main Street/SR 166, then proceed east to the landfill (2065 East Main Street, Santa Maria).

Building materials would also be brought on site via construction trucks. Trucks delivering materials during construction of the CSC would most likely use Hwy 101 to access the local area and then use Hwy 1 and SR 246 to access the site.

3.11 Water Resources

Water resources include surface water and groundwater and their physical, chemical, and biological characteristics. Surface water includes lakes, rivers, streams, and wetlands, while groundwater refers to water below the surface.

In California, the State Water Resources Control Board (SWRCB) and the RWQCB administer the State's National Pollutant Discharge Elimination System (NPDES) Program. Section 402 of the Clean Water Act (CWA) mandates the NPDES program, and U.S. EPA regulations provide the authority and framework for state regulations. The NPDES Construction General Permit regulates construction sites of 1 acre or more in California, and ensures that water discharged from a site meets water quality standards. State regulations require a Waste Discharge Requirement for permitting discharge.

The Central Coast RWQCB is the local agency responsible for the VAFB area. The Central Coast RWQCB Water Quality Control Plan (Basin Plan) provides a framework for establishing beneficial uses of water resources and the development of local water quality objectives to protect these beneficial uses.

The major freshwater resources of the VAFB region include six streams, comprising two major and four minor drainages. The major drainages are San Antonio Creek and the Santa Ynez River. The minor drainages include Shuman, Bear, Cañada Honda, and Jalama creeks. San Antonio Creek and the Santa Ynez River are the primary collection basins for runoff from VAFB. Although their collection basins are extensive, flow in these two streams is seasonal because of low precipitation and upstream damming.

The general storm water rainy season at VAFB is from 1 October to 15 April. This timeframe has the greatest potential for site pollutant runoff. The average annual rainfall is approximately 14.8 inches (unpublished data, 30 SW).

3.11.1 Surface Water

In accordance with federal requirements as outlined in Section 438 of the Energy Independence and Security Act, post-development shall "maintain or restore, to the maximum extent technically feasible, the pre-development hydrology of the property with regard to the temperature, rate, volume, and duration of flow." It should be noted that pre-development in this definition references the raw land, prior to the construction of the mobile home park. However, in this circumstance pre-development was considered as the existing pre-project condition, including existing mobile home park infrastructure. This consideration allows flows currently tributary to Lake Canyon to maintain their current pattern and allows for continued habitat in the Lake Canyon area. To meet federal requirements, the allowed post-development peak discharge shall closely match the pre-development peak runoff for the 2-, 5-, 10-, 25-, 50-, and 100-year storm events.

The approximate 71-acre proposed project area was previously utilized as a mobile home park and is currently vacant. Some features of the previous development remain, including paved and gravel roads, and existing drainage improvements, including multiple culverts and concrete swales.

The existing site consists of three distinct drainage areas (see Appendix A, Penfield & Smith Exhibit One). Hwy 1 frontage drains southeast off the property via an existing

swale (Area A in Appendix A, Penfield & Smith Exhibit One). The southwest portion of the property flows offsite via existing drainage improvements through Lake Canyon to Upper Lake (Area B in Appendix A, Penfield & Smith Exhibit One). The southeast property portion flows via existing channels through Lake Canyon to Middle Lake (Area C in Appendix A, Penfield & Smith Exhibit One). The site sits on a bluff, preventing most offsite flows from traveling onsite.

3.11.2 Groundwater

The VAFB water supply primarily comes from water purchased from the California Department of Water Resources State Water Project. Aquifers capable of yielding large quantities of water usable for water supply are generally restricted to the deeper portions of the Santa Ynez River and San Antonio Creek (USAF 1998). Four groundwater production wells located in the San Antonio Creek-Barka Slough area are used to supplement the VAFB state water. The greatest threat to groundwater is contamination from hazardous material or waste releases that could infiltrate an aquifer. Groundwater from the San Antonio Creek basin supplies water for irrigation, domestic, industrial, and municipal purposes through pumping. The only local ground drinking water sources are the water wells located near Barka Slough, which are approximately 3.8 miles southeast of the Proposed Action site.

Soil borings were taken at the Proposed Action site to determine the general subsurface profile. Four borings were taken at depths ranging from 26 to 50 feet. No groundwater was encountered in these borings. Twelve additional borings were taken at approximate depths of 5, 10, and 15 feet below the existing ground to determine site percolation rates. A boring map is included in Appendix A. Infiltration rates are presented Table 3-11.

As previously described in Chapter 2 (see Section 2.2.2.2), CSA proposes to manage domestic wastewater at the CSC through onsite reclamation and reuse. The proposed treatment system would be an activated sludge system utilizing extended aeration with membrane filtration, configured to produce disinfected tertiary recycled water as defined in Title 22, CCR. A 150 kilowatt (kW) diesel powered generator is required for treatment facility standby power, which would require a Diesel Fired Emergency/Standby Engine Application Form from the SBCAPCB.

Treated effluent would be disposed of through slow-rate percolation and evapotranspiration in landscaped areas. Projected annual

Table 3-11. Infiltration rates at the Proposed Action site.

Location*	Boring/Percolation Test Depth (ft)	Infiltration Rate (minutes/inch)	Infiltration Rate (inches/hour)
A	15	135	0.444
B	10	250	0.240
C	5	40	1.500
D	15	15	4.000
E	10	115	0.522
F	5	415	0.145
G	5	160	0.375
H	10	70	0.857
I	15	15	4.000
J	15	15	4.000
K	10	90	0.667
L	5	90	0.667

* For location, refer to Boring and percolation Test Location Map in Appendix A.

wastewater volume is 35.8 acre-feet; it is anticipated that all of the treated effluent would be beneficially reused based on the 15-planted-acre water application area at build out. To accommodate wet weather flow estimated between 20,000-30,000 gallons per day, an 8 acre-feet wet weather storage area is recommended.

3.11.3 Floodplain

The proposed project area is not within the 100-year floodplain of any of the major or minor drainages on VAFB.

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Chapter 4. Environmental Consequences

This chapter presents the results of the analysis of potential environmental effects of implementing the Proposed Action and the No-Action Alternative, as described in Chapter 2. For each environmental resource, anticipated impacts are assessed considering short- and long-term effects.

4.1 Air Quality

Potential impacts to air quality from CSC activities could result from construction and operational emissions associated with the project. Determining potential impacts involves estimating emissions generated from the proposed activities and assessing their impacts on air quality. Potential impacts were evaluated based on calculated direct and indirect emissions associated with implementation of the Proposed Action and the No-Action Alternative. Significant air quality impacts would occur if implementation of any of the alternatives would directly or indirectly:

- Expose people to localized (as opposed to regional) air pollutant concentrations that violate state or federal ambient air quality standards;
- Cause a net increase in pollutant or pollutant precursor emissions that exceeds relevant emission significance thresholds (such as the numerical values of major source thresholds for non-attainment pollutants); or
- Conflict with adopted air quality management plan policies or programs; or
- Exceed caps (limits) as imposed by federal and California GHG regulations. Note these regulations are in draft stage, but would likely be in place during project execution.

Criteria to determine the significance of air quality impacts are based on federal, state, and local air pollution standards and regulations. Under SBCAPCD Rule 202 D 16, if the combined emissions from all construction equipment used to construct a stationary source, which requires an Authority to Construct, have the potential to exceed 25 tons of any pollutant except carbon monoxide in a 12-month period, the owner of the stationary source shall provide offsets under the provisions of Rule 804 and shall demonstrate that no ambient air quality standard would be violated. Standard dust control measures must be implemented for any discretionary project involving earth-moving activities. Some projects have the potential for construction-related dust to cause a nuisance. Since Santa Barbara County violates the state standard for PM_{10}, dust mitigation measures are required for all discretionary construction activities regardless of the significance of the fugitive dust impacts based on the policies in the 1979 Air Quality Attainment Plan.

To determine the significance of operational impacts, the federal major source thresholds for criteria pollutants of 100 tons per year, which is the major source threshold under 40 CFR 70 (Federal Operating Permit Program), were used for all pollutants. For purposes of this air quality analysis, project emissions within the VAFB region would be potentially significant if they exceed these thresholds. This is a conservative approach, as the analysis compares emissions from both project-related stationary and mobile sources to these thresholds.

If emissions exceed a significance threshold described above, further analysis of the emissions and their consequences would be performed to assess whether there was likelihood of a significant impact to air quality. The nature and extent of such analysis would depend on the specific circumstances. The analysis could range from simply a more

detailed and precise examination of the likely emitting activities and equipment, to air dispersion modeling analyses. If the Proposed Action emissions were determined to increase ambient pollutant levels from below to above a national or state ambient air quality standard, these emissions would be significant.

4.1.1 Proposed Action

The Proposed Action consists of the construction and operation of the CSC at VAFB, as described in Chapter 2. The Center would be constructed in phases, with construction commencing in the 4th quarter of 2010, and with completion in the first quarter of 2019. At full build out the project would provide 468,000 square feet of buildings, 1,584 parking spaces, and an aboveground, four-level, 201,000 square foot parking structure. Air quality impacts from proposed construction activities would occur from: (1) combustion emissions due to the use of fossil fuel-powered equipment, and (2) fugitive dust emissions (PM_{10} and $PM_{2.5}$) during earth-moving activities, and materials handling.

Specific construction requirements are not accurately known at this time given that the project is in the design stage; however, they have been estimated for the purpose of this analysis. To ensure that the project would not exceed construction emission standards estimated below, records of construction equipment and truck trips would be maintained by the construction contractor to accurately account for emissions that occur during project implementation. If required, the records and associated emission calculations would be provided for reporting purposes to the SBCAPCD.

Factors needed to derive construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (U.S. EPA 2002), the South Coast Air Quality Management District's (SCAQMD) California Environmental Quality Act Air Quality Handbook (SCAQMD 1999), the CARB's OFFROAD emission factors from the OFFROAD2007 Model (CARB 2007a), and the EMFAC2007 (CARB 2007b) model.

Construction scenarios for the CSC are described in Chapter 2. In addition to construction emissions from onsite equipment use and fugitive dust, emissions from construction workers commuting to and from the construction sites, and emissions associated with trucks hauling material from the construction sites to various disposal sites were calculated using emission factors from the CARB's EMFAC2007. The main fugitive dust emissions were considered to occur during Phase 0, when demolition and site grading would occur. A complete description of the construction assumptions, equipment required for construction, estimates of workforce requirements, and haul truck travel are provided in Appendix B, along with the emission calculations for construction activities. Construction emissions are summarized in Table 4-1. As shown, construction emissions would not exceed the significance thresholds for any criteria pollutant. Thus, construction during the Proposed Action would result in less than significant impacts to air quality.

Emissions would also be associated with operation of the CSC. The main source of emissions from operation of the CSC would be attributable to vehicles traveling to visit the CSC, employee vehicles, and indirect emissions from energy use at the site. As stated in the description of the Proposed Action in Section 2.3.3, *Employee and Visitor Numbers, and Hours of Operation*, the CSC is expected to provide facilities and space for 1,713 permanent jobs and attract between 200,000 and 500,000 visitors per year. To estimate emissions associated with vehicles, the EMFAC2007 model was run for the Santa Barbara region. To estimate emissions associated with area sources, such as natural gas combustion, landscaping, and maintenance architectural coatings use, the URBEMIS Model, Version 9.2.4, was used.

Table 4-1. Proposed Action construction emissions (tons/year).

	CO	VOCs	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Phase 0						
Heavy Construction Equipment	1.00	0.30	2.69	0.00	0.12	0.11
Construction Worker Travel	0.46	0.09	1.59	0.00	0.06	0.06
Haul Trucks	3.50	0.20	0.37	0.00	0.02	0.02
Fugitive Dust					1.36	0.29
Total Phase 0	***4.96***	***0.59***	***4.65***	***0.00***	***1.56***	***0.48***
Significance threshold	25	25	25	25	25	25
Exceeds threshold?	No	No	No	No	No	No
Phase 1						
Heavy Construction Equipment	0.67	0.19	1.78	0.00	0.08	0.07
Construction Worker Travel	0.46	0.09	1.59	0.00	0.06	0.06
Haul Trucks	3.50	0.20	0.37	0.00	0.02	0.02
Total Phase 1	***4.63***	***0.48***	***3.74***	***0.00***	***0.16***	***0.15***
Significance threshold	25	25	25	25	25	25
Exceeds threshold?	No	No	No	No	No	No
Phase 2						
Heavy Construction Equipment	1.52	0.43	3.74	0.00	0.15	0.13
Construction Worker Travel	0.34	0.07	1.12	0.00	0.04	0.04
Haul Trucks	2.85	0.17	0.30	0.00	0.02	0.02
Total Phase 2	***4.71***	***0.67***	***5.16***	***0.00***	***0.21***	***0.19***
Significance threshold	25	25	25	25	25	25
Exceeds threshold?	No	No	No	No	No	No
Phase 3						
Heavy Construction Equipment	0.27	0.07	0.50	0.00	0.02	0.02
Construction Worker Travel	0.19	0.04	0.56	0.00	0.02	0.02
Haul Trucks	1.71	0.11	0.17	0.00	0.02	0.02
Total Phase 3	***2.17***	***0.22***	***1.23***	***0.00***	***0.06***	***0.06***
Significance threshold	25	25	25	25	25	25
Exceeds threshold?	No	No	No	No	No	No

In addition to vehicular emissions and area sources, it was assumed that the facility would install four 500 kW emergency generators to provide power in the event of a power outage. The main source of power for the CSC would come from electricity provided from the grid. The emergency generators would be operated for testing purposes only. It was assumed they would operate in total 1 hour per week, 52 weeks per year.

The CSC would also install natural gas-fired boilers/heaters for each building. Table 4-2 provides the estimated maximum rated heat capacity for boilers/heaters for each building.

The emergency generators, boilers and heaters would be subject to the requirements of the SBCAPCD to obtain an Authority to Construct prior to installation, and a Permit to Operate upon installation.

Table 4-2. Anticipated heat capacity of boilers and heaters at the CSC.

Description	Heat Capacity (MMBTU/hour)
Mission Support Complex (Phase I)	4.0
Back of House (Phase II)	1.01
Adult Education Center (Phase II)	2.78
Visitor Center (Phase II)	3.66
Youth Education Center (Phase III)	2.0
Mission Support Complex (Phase III)	2.04

MMBTU = One thousand thousand British Thermal Units

Applicable SBCAPCD rules and regulations are as follows:

- Rule 201 – Permits Required
- Rule 204 – Applications
- Rule 302 – Visible Emissions
- Rule 333 – Control of Emissions from Reciprocating Internal Combustion Engines (Note that engines that operate less than 200 hours per year are exempt from the provisions of this rule, with the exception of the engine identification requirement in Section D.1, the elapsed operating time meter requirement in Section D.2, the recordkeeping provisions in Section J.3, and the compliance schedules for these provisions specified in Section K)
- Rule 360 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers
- Rule 361 – Small Boilers, Steam Generators, and Process Heaters

Table 4-3 provides a summary of annual operational emissions associated with the CSC. Operation of the CSC under the Proposed Action would result in less than significant impacts to air quality.

Greenhouse Gases and Global Climate Change

Emissions of GHG are considered to have a potential cumulative impact on global climate. The emissions associated with construction and operation of the proposed CSC would incrementally increase regional emissions of CO_2 and other GHG. Scientists are in general agreement that the Earth's climate is gradually changing, and that change is due, at least in part, to emissions of CO_2 and other GHG from manmade sources. The anticipated magnitude of global climate change is such that a significant cumulative impact on global climate exists.

On the issue of global climate change, however, there are no adopted federal plans, policies, regulations, or laws mandating reductions in the GHG emissions that cause global climate change. The climate change research community has not yet developed tools specifically intended to evaluate or quantify end-point impacts attributable to the emissions of GHG from a single source. In particular, because of the uncertainties involving the assessment of such emissions regionally and locally, the very minor and incremental contribution of the Proposed Action to climate change cannot be determined, given the current state of the science and assessment methodology.

It should be noted that the CSC is not part of VAFB's GHG program, and would not be subject to VAFB's compliance program under California Assembly Bill 32 requirements. This project would be identified as a separate facility in accordance with the definition of facility (40 CFR 98.6) as applicable to military installations. Accordingly, GHG emissions from the construction and operation of the CSC would be regulated separately.

Table 4-3. Proposed Action operational emissions (tons/year).

	CO	VOCs	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Visitor Vehicles	45.81	8.33	4.18	0.05	0.48	0.48
Employee Travel	39.23	7.13	3.58	0.04	0.41	0.41
Area Sources	0.96	0.79	0.81	0.00	0.00	0.00
Emergency Generators	0.12	0.04	0.54	0.04	0.04	0.04
Boilers/Heaters	0.16	0.01	0.09	0.00	0.01	0.01
Total Operations	***86.28***	***16.30***	***9.20***	***0.13***	***0.94***	***0.94***
Significance threshold	100	100	100	100	100	100
Exceeds threshold?	No	No	No	No	No	No

To calculate emissions associated with the proposed project, emissions attributable to Scopes 1, 2, and 3, as defined in EO 13514, have been estimated. Scope 1 emissions include those emissions attributable to sources that are owned and operated by the Federal Government. These emissions would include emissions from stationary sources at the project site. It should be noted that the CSC would obtain the majority of its power and heating from electricity generated on the grid; therefore, Scope 1 GHG emissions are limited to emissions from emergency generators that would only be operated for testing purposes on a regular basis.

Scope 2 emissions include those emissions that are direct GHG emissions resulting from the generation of electricity, heat, or steam purchased by a federal agency. For the proposed project, these emissions are accounted for in the area sources, which include direct GHG emissions resulting from the generation of electricity and heat purchased for operation of the CSC. Scope 3 emissions include GHG emissions from sources not owned or directly controlled by a federal agency but related to agency activities such as vendor supply chains, delivery services, and employee travel and commuting. For the Proposed Action, these GHG emissions include emissions associated with construction of the CSC, which would be carried out by vendors, as well as emissions attributable to both visitor and vendor vehicles.

Table 4-4 summarizes the annual GHG emissions associated with construction and operation of the CSC. Estimates of GHG emissions generated by Proposed Action are presented in Appendix B. These data show that the ratio of annual carbon dioxide equivalent (CO_{2e}) emissions estimated for Proposed Action to CO_{2e} emissions generated from all sources in the U.S. (in 2006) is approximately 0.0089/7,054 million metric tons (U.S. EPA 2009b). Therefore, CO_{2e} emissions associated with the Proposed Action would amount to approximately 0.00013 percent of the total CO_{2e} emissions generated by the U.S. Under any of the alternatives, cumulative impacts to global climate change would not be significant.

Table 4-4. Annual GHG emissions under the Proposed Action.

Scenario/Activity	Metric Tons per Year[1]			
	CO_2	CH_4	N_2O	CO_{2e}
Construction				
Phase 0	616	0.05	0.41	744
Phase 1	543	0.05	0.33	646
Phase 2	797	0.06	0.44	937
Phase 3	460	0.03	0.13	500
Operations				
Visitor Vehicles	4,114	0.34	0.72	4,344
Employee Travel	3,524	0.29	0.61	3,721
Area Sources	886	-	-	886
Emergency Generators	18	-	-	18
Boilers/Heaters	207	0.00	0.00	207
TOTAL	***8,749***	***1***	***1***	***9,176***
U.S. 2006 Baseline Emissions (10^6 metric tons) [2]	-	-	-	7,054.2
Proposed Emissions as a % of U.S. Emissions	-	-	-	0.00013

NOTES:
1 CO2e = (CO2 * 1) + (CH4* 21) + (N2O * 296).
2 (U.S. EPA 2009b).

A final decision for assigning reporting responsibility of GHG emissions during construction and operation of the CSC, and responsibility for ensuring required reductions are met, would be made by the CARB, the SBCAPCD, and the Air Force prior to the start of any project activities and with full cooperation of regulatory agencies.

4.1.2 Environmental Protection and Minimization Measures

Implementation of the environmental protection and minimization measures outlined below should avoid or minimize potential adverse effects to air quality during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented.

- Before construction begins for the Proposed Action, portable equipment meeting the criteria defined in the Final Regulation Order, effective September 12, 2007 for the California Portable Equipment Registration Program would be registered in the program or have a valid SBCAPCD Permit to Operate.
- Portable diesel equipment would comply with the Airborne Toxic Control Measure for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater, dated September 12, 2007.
- Equipment usage and fuel consumption would be documented and reported to the 30th Civil Engineer Squadron Asset Management Flight (30 CES/CEA) to facilitate tracking construction emissions for inclusion in the VAFB Air Emissions Inventory.
- Idling of heavy-duty diesel trucks during loading and unloading would be limited to 5 minutes, with auxiliary power units used whenever possible.

Although significant emissions would not occur from the Proposed Action, the following SBCAPCD dust control measures would be implemented to further decrease fugitive dust emissions from ground disturbing activities:

- Water would be applied at least twice daily to dirt roads, graded areas, and dirt stockpiles to prevent excessive dust at the staging areas. Watering frequency would be increased whenever the wind speed exceeds 15 miles per hour (mph). Chlorinated water would not be allowed to run into any waterway.
- Vehicle speeds would be minimized on exposed earth.
- Ground disturbance would be limited to the smallest practical area and to the least amount of time.
- The SWPPP, including Best Management Practices (BMPs) to reduce dust emissions, and the Environmental Protection Plan (EPP), which includes dust control compliance measures, would be implemented.
- If importation, exportation, and stockpiling of fill material were involved, soil stockpiled for more than 2 days would be covered, kept moist, or treated with soil binders to prevent dust generation. Trucks transporting fill material to and from the site would be tarped from the point of origin.

In addition to the above dust control measures, the following control measures would be implemented to decrease diesel emissions. Diesel engines operated in California are required to meet CARB established standards, which may be more stringent than federal mandates.

- When feasible, equipment powered with federally mandated ultra-low sulfur diesel engines would be used.
- Engine size in equipment used for the project would be minimized.
- The use of equipment would be managed to minimize the number of pieces of equipment operating simultaneously and total operation time for the project.
- Engines would be maintained in tune per manufacturer or operator specification.
- CARB-certified diesel fuel would be used.
- If feasible, U.S. EPA or CARB-certified diesel catalytic converters, diesel oxidation

catalysts, and diesel particulate filters would be installed.

- CARB-developed idling regulations for trucks during loading and unloading would be followed.
- When applicable, equipment powered by diesel engines retrofitted or re-engined to meet the Air Toxics Control Measures for Off-Road Vehicles, would be used.

4.1.3 No-Action Alternative

Under the No-Action Alternative, the CSC would not be constructed or operated. No air emissions would be associated with the No-Action Alternative; however, the No-Action Alternative would not meet the purpose and need of the proposed project.

4.2 Biological Resources

Impacts to biological resources would occur if special status species (i.e., endangered, threatened, rare, or candidate) or their habitats, as designated by federal and state agencies, would be directly or indirectly affected by project-related activities. In addition, impacts to biological resources are considered adverse if substantial loss, reduction, degradation, disturbance, or fragmentation would occur in native species habitats or in their populations. These impacts can be short- or long-term impacts, such as short-term impacts from noise and dust during construction, and long-term impacts from the loss of vegetation, and consequently, loss of the capacity of habitats to support wildlife populations.

4.2.1 Proposed Action

The Proposed Action would potentially result in disturbance to approximately 105.1 acres (including buffer areas). These activities have the potential to result in short-term, temporary, adverse effects to biological resources in the utility corridor and construction buffer areas, as well as long-term permanent effects within the construction area. Specific effects on botanical and wildlife resources are discussed in more detail below, and potential effects to special status species from the Proposed Action are summarized in Table 4-5. Measures to minimize or avoid adverse effects on natural resources and special status species during project implementation are summarized in Section 4.2.2.

4.2.1.1 Botanical Resources

Potential effects to plant communities and plant species include:

- Short-term (temporary) and long-term (permanent) loss of habitat from construction-related activities such as access, excavation, and building of structures
- Loss of individuals within project areas due to excavation, crushing, or burial
- Loss of individuals in habitats adjacent to work areas due to soil erosion

Table 4-6 lists acreages of vegetation types and special status species habitat potentially affected by the Proposed Action. It is expected that impacts to areas within the utility corridor and construction buffer areas would be largely temporary, with vegetation allowed to regenerate following completion of project activities. Vegetation types occurring within the construction area are expected to suffer permanent loss or alteration with the exception of select wetland areas slated for protection.

4.2.1.2 Wildlife Species

The potential adverse effects to wildlife species associated with the Proposed Action include:

- Short-term (temporary) and long-term (permanent) loss of habitat from construction-related activities such as access, excavation, and building of structures
- Loss of individuals within the work area due to excavation, crushing, or burial
- Loss of individuals in habitats adjacent to work areas due to soil erosion

Table 4-5. Potential effects from the Proposed Action on special status species.

Scientific Name **Common Name**	**Status**		**Occurrence**	**Potential Effects**
	USFWS[1]	**CDFG[2]**		
Invertebrates				
Branchinecta lynchi Vernal pool fairy shrimp	FT		Documented	Loss of adults, cysts, and habitat, and disruption of normal behavior
Euphilotes battoides allyni El Segundo blue butterfly	FE		Potential	Loss of eggs, larvae, and pupae, and host plant seacliff buckwheat, and disruption of normal behavior
Amphibians				
Spea hammondii Western spadefoot		SSC	Potential	Loss of individuals, and breeding and upland habitat, and disruption of normal behavior
Rana draytonii California red-legged frog	FT	SSC	Documented	Loss of individuals and upland habitat, barriers to movement, and disruption of normal behavior
Reptiles				
Phrynosoma coronatum Coast horned lizard		SSC	Potential	Loss of individuals and habitat, and disruption of normal behavior
Anniella pulchra Silvery legless lizard		SSC	Potential	Loss of individuals and habitat, and disruption of normal behavior
Birds				
Aquila chrysaetos (non-breeding/wintering) Golden eagle	BGEPA		Potential	Disruption of normal behavior, loss of foraging habitat
Selasphorus sasin Allen's hummingbird	BCC		Potential	Disruption of normal behavior, loss of foraging and breeding habitat
Picoides nuttallii Nuttall's woodpecker	BCC		Documented	Disruption of normal behavior, loss of foraging and breeding habitat
Lanius ludovicianus Loggerhead shrike	BCC	SSC	Documented	Disruption of normal behavior, loss of foraging and breeding habitat
Baeolophus inornatus Oak titmouse	BCC		Documented	Disruption of normal behavior, loss of foraging and breeding habitat
Dendroica petechia Yellow warbler	BCC		Potential	Disruption of normal behavior, loss of foraging habitat
Agelaius tricolor Tricolored blackbird	BCC	SSC	Potential	Disruption of normal behavior, loss of foraging habitat
Carduelis lawrencei Lawrence's goldfinch	BCC		Potential	Disruption of normal behavior, loss of foraging and breeding habitat
Mammals				
Taxidea taxus American badger		SSC	Documented	Disruption of normal behavior, loss of foraging and breeding habitat

NOTES:
1 FE = Federal Endangered Species FT = Federal Threatened Species BGEPA = Bald and Golden Eagle Protection Act
BCC = Federal Bird of Conservation Concern
2 CDFG = California Department of Fish and Game SSC = California Species of Special Concern

Table 4-6. Acreage of each vegetation or species habitat type potentially affected by the Proposed Action.

Vegetation/Habitat Type	Utility Corridor (acres)	Construction Area (acres)	Construction Buffer/Area of Potential Disturbance (acres)
Central Coast Scrub	0.29	2.75	3.53
Mixed Central Coast Scrub/ Non-native Grassland	-	0.47	0.55
Non-native Grassland	2.22	51.17	11.27
Vernal Marsh	0.01	0.57	0.26
Arroyo Willow Riparian Forest	0.23	0.03	0.31
Non-native Tree	1.22	4.16	1.20
Burton Mesa Chaparral	8.87	-	-
Mixed Burton Mesa Chaparral/ Non-native Grassland	1.89	-	-
Ruderal	-	0.04	0.65
Vernal Pool Fairy Shrimp Habitat	-	0.05	-
El Segundo Blue Butterfly Habitat	-	0.04	0.006
California Red-legged Frog Habitat	0.24	0.67	1.12

- Short-term (temporary) abandonment of roosting sites due to project-related noise and associated disturbance
- Disruption of foraging or roosting activities due to project-related noise and associated disturbance
- Degradation of water quality in wetlands within the project area due to turbidity

Wildlife, including mammals, amphibians, reptiles, and birds, present in the vicinity of project activities could be affected by project-generated noise. Wildlife response to noise can be physiological or behavioral. Physiological responses can range from mild, such as an increase in heart rate, to more damaging effects on metabolism and hormone balance. Behavioral responses to manmade noise include attraction, tolerance, and aversion. Each has the potential for negative and positive effects, which vary among species and individuals of a particular species, due to temperament, sex, age, and prior experience with noise. Responses to noise are species-specific; therefore, it is not possible to make exact predictions about hearing thresholds of a particular species based on data from another species, even those with similar hearing patterns.

Potential impacts to wildlife species from human presence, project-generated noise, and disturbance associated with project implementation include temporary disruption of foraging and roosting activities and loss of habitat. Wildlife species would be expected to move away from the areas of disturbance during construction activities. These disturbances would be considered short-term and temporary, and would not be considered of a magnitude to result in adverse impacts to populations within the vicinity of the proposed project area, given the availability of ample habitat in the surrounding areas. Areas within the buffer zone and utility corridor are anticipated to return to natural vegetation types, and wildlife species are expected to return to these areas.

The Migratory Bird Treaty Act provides federal protection to native avian species, their nests, eggs, and unfledged young. Vegetation removal should be conducted outside of the February to August breeding season (for most migratory bird species) to minimize impacts to

nesting birds. Alternatively, surveys for the presence of nesting birds should be conducted prior to any vegetation removal during this time period. If active nests (with eggs or unfledged young) are found, vegetation removal would be restricted until all young have fledged the nests, and a VAFB Biologist would be consulted.

4.2.1.3 Sensitive Vegetation Types and Special Status Species

The proposed project would result in the temporary disturbance of riparian and wetland habitat within the project area due to project-related activities, and the loss of some wetlands (vernal marsh) as a result of construction. A wetland delineation completed in April 2009 (LSA 2009) provides approximate acreages of disturbance to these habitats, which are discussed in more detail in Section 4.2.1.4 below.

Formal section 7 consultation for federally listed species with the potential to be affected was completed, and a Biological Opinion (8-8-10-F-15) issued by the USFWS (available upon request). The USFWS concluded that the Proposed Action would not jeopardize the continued existence of the three federally threatened and endangered species (vernal pool fairy shrimp, El Segundo blue butterfly, and California red-legged frog) present or with potential to occur within the project area.

The USFWS based its conclusions on the following factors:

- A very small proportion of potentially occupied El Segundo blue butterfly habitat occurring on VAFB, and no known occupied habitat, would be lost as a result of project activities.
- CSA will attempt to offset the adverse effects of the subject action and create habitat for the El Segundo blue butterfly by removing ice plant and planting 2,980 seacliff buckwheat plants.
- A very small proportion of occupied vernal pool fairy shrimp habitat occurring on VAFB would be lost as a result of project activities.
- CSA will attempt to offset the adverse effects on the vernal pool fairy shrimp by creating new vernal pools near the intersection of Pine Canyon Road and Utah Avenue on VAFB.
- Expect that few California red-legged frogs will be injured or killed, and no aquatic California red-legged frog habitat will be lost as a result of project activities.

Additionally, the USFWS issued an Incidental Take Statement requiring CSA and VAFB, as appropriate, to comply with reasonable and prudent measures by following specific terms and conditions, as described below in Section 4.2.2. CSA shall fund, implement, and comply with all such terms and conditions.

Potential adverse effects of the Proposed Action on federally listed species are described below. Implementation of the environmental protection and minimization measures described in Section 4.2.2 should ensure that adverse effects are less than significant for any of these species and their habitats.

Vernal Pool Fairy Shrimp

Branchinecta sp. cysts, likely *B. lynchi*, were identified within five pools in the proposed project area, representing approximately 0.07 acre of habitat (Helm Biological Resources 2009). Of the five, two pools were inadvertently destroyed during fire suppression efforts in September 2009, and one pool (0.03 acres) would be preserved as part of project activities. The remaining two pools (0.02 acre) are located in areas designated for construction and would be lost during project activities. The UFWS expects that vernal pool fairy shrimp present in the affected wetlands would be killed, injured, or harmed.

If construction occurs during the wet season when pools are holding water, aquatic life stages may suffer mortality. Depending on the nature of the construction activity at each pool site, cysts may alternately be entombed below structures or remain present in soil, but under conditions that are not conducive to emergence (i.e., in an area that no longer

pools). Irrigation of unpaved areas within the project area could also cause cysts present in the soil to fungus. Altered drainage patterns due to construction may also impact the ability of pools to fill.

Potential loss or degradation to vernal pool fairy shrimp habitat (0.05 acre) is relatively small, with habitat within the proposed project area comprising 0.06 percent of occupied acreage on VAFB (82.26 acres). One of the three extant pools (0.03 acre) within the project area would be preserved. As described in the Biological Assessment (MSRS 2009), any habitat lost would be replaced in such a way as to ensure occupancy, thus resulting in no net loss of habitat on VAFB. Specific measures described in the Biological Opinion are included in Section 4.2.2.

El Segundo Blue Butterfly

Seacliff buckwheat distribution is very limited within the proposed project area and the surrounding vegetation. A total of 298 plants were identified within the project area during field surveys. Seacliff buckwheat was not observed in areas immediately adjacent to the proposed project area. Due to the relatively small area occupied by the plants (0.05 acre) and its distance from sizable stands of buckwheat, plants present within the site may not be capable of sustaining long-term occupancy by El Segundo blue butterflies. This conclusion is further supported by the absence from the site of Mormon metalmarks (*Apodemia mormo*), which also use *Eriogonum* sp. as their sole host plant and are ubiquitous where large stands of buckwheat occur on VAFB.

Seacliff buckwheat within the proposed project area, however, cannot be fully excluded as potential habitat for El Segundo blue butterflies. If the butterflies occur within the site, the destruction of buckwheat plants during the June through September period when eggs or larvae may be present would result in mortality of these life stages. Adults may suffer direct mortality from vehicle strikes, and from traffic on roads and in parking lots during their mid-June through August activity period. Sustained activity during the adult flight season may also disrupt normal behavior such as feeding and breeding. Vehicle traffic and other activities causing soil compaction, especially in proximity to seacliff buckwheat, have potential to crush diapausing pupae.

The USFWS anticipates that El Segundo blue butterflies, if present, would be subject to death, injury, or harm. The El Segundo blue butterfly could be on the wing or occupying seacliff buckwheat plants in the action area. If El Segundo blue butterflies in the action area are in diapause, project activities may crush or otherwise injure diapausing pupae. Additionally, adult El Segundo blue butterflies that survive project activities and emerge from their pupae could be adversely affected to the point of harm if they have to fly a substantial distance to other seacliff buckwheat plants to feed, breed, and shelter.

The full extent of the distribution of El Segundo blue butterflies on VAFB is not known. Seacliff buckwheat is common on VAFB in dune scrub and central coast scrub vegetation types. Due to the relatively small size of habitat within the project area, its isolation, the extensive distribution of seacliff buckwheat on VAFB, and the fact that El Segundo blue butterflies have not been documented within known dispersal distance of the proposed project area, loss of habitat within the site is unlikely to adversely affect VAFB populations of the butterfly. As described in the Biological Assessment (MSRS 2009) lost buckwheat plants would be replaced at a ratio of 1:10 in an El Segundo blue butterfly restoration area designated by a VAFB biologist. Specific measures described in the Biological Opinion are included in Section 4.2.2.

California Red-legged Frog

California red-legged frogs have potential to occur in virtually all VAFB wetlands (Christopher, unpublished data). Not all wetlands have been mapped on Base and upland habitat has never been quantified. Suitable breeding and upland habitat on VAFB are extensive. Due to the transitory

nature of water and lack of heavy vegetative cover associated with the wetlands within the proposed project area, it is unlikely that California red-legged frogs occupy the site on a regular basis. The fact that water depths within all but one wetland do not have the potential to exceed 16 inches, and the deep wetland only does so when at peak capacity on high rain years, makes all wetlands on site unsuitable for breeding (Christopher 1997). The deep wetland would be preserved.

There is a wetland approximately 0.2 mile from the proposed project area that was not included in winter and spring surveys for this project and which occurs within an artificially created retention basin that appears to receive water from sewer overflow pipes originating at the former trailer park site. However, Christopher surveyed the area extensively in 2001 and did not document California red-legged frogs (Christopher 2002). There are localized areas of ponding within the retention basin which held water to depths exceeding 2 feet during the winter of 2008 through 2009 (Liz Bell, pers. comm.). All wetlands within the retention basin were dry during August surveys. Depending on annual rainfall levels, this area may constitute suitable breeding habitat for California red-legged frogs. The retention basin is approximately 0.6 mile from the nearest documented California red-legged frog locality (Pine Canyon Lakes).

While Christopher did not document frogs at Pine Canyon Lakes during any surveys (1996, 1997, and 1998), Tetra Tech (2003) documented two frogs in Pine Canyon Lakes in 2000. Surveys conducted by VAFB Biologists during the winter 2009 were unable to document California red-legged frogs in Pine Canyon Lakes.

Some loss of wetland habitat (vernal marsh), and potential impediments to frog movement (roads and structures) would result from construction within the proposed project area. Impacts to California red-legged frogs stemming from impacts to the drainage basin cannot be accurately assessed at this time, as it is unknown how dependent ponding in the artificial retention basin is on water input from the proposed project area. Additionally, it is unknown if this area is actually suitable for California red-legged frog breeding or extended occupancy, due to a lack of survey data. However, California red-legged frogs have the potential to seasonally occur within and traverse the proposed site for the CSC. The presence of water retention ponds within the site has the potential to attract frogs. Because of their closeness to the highway and parking areas, it is possible that frogs could be exposed to traffic hazards resulting in injury or mortality.

The USFWS does not anticipate that any California red-legged frogs would be killed or injured during construction of the CSC because the action area does not contain California red-legged frog aquatic habitat. However, the USFWS expects that California red-legged frogs will be subject to mortality, injury, harm, and harassment during operation of the Space Center, since the presence of water in the sewer/detention ponds will at least attract California red-legged frogs to the action area, where they will be subject to increased likelihood of take by predators, vehicles, and human activity. After construction is completed, if more than three California red-legged frogs are found dead or injured, CSA with Air Force coordination will contact the USFWS to determine whether additional protective measures are needed.

Measures would be implemented to minimize the potential attraction of frogs to the area, and preclude their subsequent establishment, including trimming vegetation to avoid creating habitat, and fencing the ponds to exclude frogs. Surveys would also be conducted after significant rain events to document whether frogs are present within the area, and to determine whether additional measures are needed to prevent their establishment. Any California red-legged frogs found during the surveys would be relocated to a pre-designated site that provides suitable habitat and is sufficiently distanced from the CSC site to prevent their return and potential exposure to vehicle

hazards. With the implementation of these measures, adverse effects to California red-legged frogs would be less than significant. Specific measures described in the Biological Opinion are included in Section 4.2.2.

Special Status Plant Species

No special status plants have been documented at the site in the past, and the surveys conducted in 2008 (Tetra Tech 2009a, 2009b) and 2009 (MSRS surveys for this project) did not document the presence of any special status plant species. However, because previous surveys occurred outside of the optimal blooming period (late spring to early summer) for plant species, a special status plant survey should be conducted in the May – July timeframe, prior to the start of construction activities. If special status plant species are documented within the project area, plants would either be avoided or losses mitigated to ensure adverse effects are less than significant. This survey effort would be coordinated with the VAFB Botanist.

Special Status Amphibian and Reptile Species

Western spadefoot, coast horned lizard, and silvery legless lizard may breed and forage within the proposed project area. Disturbances resulting from human presence and project activities would temporarily disrupt these activities and potentially result in mortality of individuals within the site. Additional suitable habitat not subject to these disturbances is available in the vicinity, thus adverse effects should be less than significant.

Special Status Bird Species

Impacts on breeding activities of special status avian species would be minimized by ensuring vegetation removal occurs outside of the breeding season (March – August 15) or by completing surveys prior to vegetation removal that would allow for implementing measures to minimize adverse effects. Disturbances resulting from the presence of human activity would disrupt roosting and foraging activities if birds are present within the proposed project area. These disturbances would be short-term, and additional suitable habitat not subject to these temporary disturbances is available in the vicinity; thus, adverse effects should be less than significant.

Special Status Mammal Species

American badger may breed and forage within the proposed project area. Disturbances resulting from human presence and project activities would temporarily disrupt these activities and potentially result in mortality of individuals within the site. Additional suitable habitat not subject to these disturbances is available in the vicinity, thus adverse effects should be less than significant.

Other Species Considered

Vandenberg monkey flower may be present within the proposed project area. Soil disturbance and construction within the site have the potential to result in loss of individuals, seed bank, and habitat. The habitat most likely to be occupied by this species within the proposed project area occurs in the utility corridor. Disturbance to habitat in this area is likely to be temporary. Focused surveys for this species would be conducted in late spring to early summer, prior to construction. If the species is documented within the project area, measures to minimize adverse effects would be discussed with the VAFB Botanist.

Adverse effects to the population in the vicinity of Pine Canyon Lakes are not anticipated. The hydrology at Pine Canyon Lakes would not be affected by this project given the CWA-mandated requirement to match pre-development flow (see Sections 3.11 and 4.11).

4.2.1.4 Waters of the United States and Wetlands

Impacts to jurisdictional waters of the U.S. and wetlands are considered significant if the project results in a net loss of wetland area or habitat value, either through direct or indirect impacts to wetland vegetation, loss of habitat for wildlife, degradation of water quality, or alterations in hydrological function.

Based on the wetlands delineation conducted in March and April 2009 (LSA 2009) and the disturbance footprint for the proposed project, it is anticipated that 1.34 acres of wetland habitat could be disturbed. Of these 1.34 acres, the 0.5 acre of riparian forest qualifying as a jurisdictional wetland, and 0.38 acre within the construction area would be avoided and temporary disturbances (i.e., dust from construction activities in adjacent areas) minimized by erecting exclusionary fencing and implementing construction BMPs (i.e., dust control measures described in Section 4.1.2). Wetland habitat (vernal marsh) lost as a result of construction would be replaced outside of the project area at a site conducive for successful establishment. A CWA Section 401 Water Quality Certification from the Central Coast RWQCB and CWA Section 404 Permit from the USACE would be required because direct impacts to water bodies or wetlands would occur. Compliance with the conditions of the Section 401 and 404 permits would ensure no net loss of wetlands occurs. With these measures, impacts would be less than significant.

4.2.2 Environmental Protection and Minimization Measures

Environmental protection and minimization measures are considered integral elements of the project description, and would be fully implemented. As the proponent of the Proposed Action, the CSA, shall fund, implement, and comply with all protective and compensatory measures required for vernal pool fairy shrimp, El Segundo blue butterfly, and California red-legged frog, in accordance with the terms and conditions of the Biological Opinion issued by the USFWS (8-8-10-F-15):

Vernal Pool Fairy Shrimp

- The CSA will preserve a 0.03 acre vernal pool within the project area where vernal pool fairy shrimp cysts were documented, and will restrict project activities from occurring within this wetland.
- The CSA will place appropriate temporary sedimentation barriers and construction fencing to protect this vernal pool from project activities.
- If project activities affect an occupied vernal pool during the wet season, the CSA will survey the pool for two wet seasons to determine if it remains occupied by vernal pool fairy shrimp. If not, seed cysts from a nearby pool will be used to "reoccupy" the affected pool. The CSA would again survey the wetland for two wet seasons to determine continued occupancy.
- If project activities affect an occupied vernal pool during the dry season, the CSA will collect and store cysts from the pool prior to the disturbance. If the pool remains after construction, the CSA will place those cysts back in the pool when work is complete. If the pool is lost, the cysts will be used to inoculate a new pool.
- Two vernal pools occupied by vernal pool fairy shrimp will be lost as part of project activities. The CSA will create a new pool with a surface area equal to the sum of the surface areas of the two destroyed pools. The CSA will use cysts collected from the destroyed pools to "reoccupy" the new pool. The replacement pool site will be in the existing vernal pool complex near the intersection of Pine Canyon Road and Utah Avenue on VAFB. The CSA will remove non-native plants within 100 feet of the new pool and use native seeds from nearby pools to vegetate the new pool. The CSA will monitor the new pool for 3 years to determine continued occupancy.

El Segundo Blue Butterfly

- A USFWS-approved biologist will conduct surveys for the El Segundo blue butterfly during the flight season within the proposed project area and surrounding habitat.
- A qualified biologist will mark seacliff buckwheat plants that can be avoided during construction, and monitor project activities to ensure impacts to seacliff buckwheat are minimized and losses quantified.

- Seacliff buckwheat damaged or destroyed during construction will be replaced at a 1:10 ration at the El Segundo blue butterfly restoration area near Wall Beach on VAFB. California buckwheat (*Eriogonum fasciculatum*) plants and buckwheat plants that are not native to VAFB will not be planted.

California Red-legged Frog

- The Air Force will conduct protocol surveys in the retention basin southeast of the proposed project area to determine occupancy by, and habitat value for the California red-legged frog. If surveys document that the retention basin is occupied by California red-legged frogs and hydrogeologic study results indicate that the basin would be adversely impacted by project activities, the CSA will enhance one of the artificial ponds in the wildlife resources area off of Terra Road on VAFB.

- A USFWS-approved biologist will survey the proposed project site prior to and during initial vegetation clearing in areas where California red-legged frogs could potentially occur. Any California red-legged frogs located in harm's way will be relocated to either the retention basin or appropriate habitat at the Pine Canyon Lakes.

- The CSA will place exclusion fencing around the water retention ponds.

- The CSA will maintain water levels in the retention ponds as low as possible to discourage breeding by California red-legged frogs in the event they gain access to the ponds.

- A USFWS-approved biologist will survey the retention ponds after substantial rain events (greater than 0.5 inch in 24 hours), and prior to vegetation maintenance/clearing inside the exclusion fencing.

- A UFSWS-approved biologist must be on-site to monitor for California red-legged frogs during all nighttime project activities that take place during the breeding season.

Additional Measures in Compliance with the Biological Opinion

- A qualified biologist(s), familiar with the El Segundo blue butterfly, California red-legged frog, and vernal pool fairy shrimp must conduct a training session for all project personnel prior to the onset of any ground-disturbing activities within the action area. At a minimum, this training must include a description of the El Segundo blue butterfly, California red-legged frog, vernal pool fairy shrimp and their habitats, the general provisions of the ESA, the necessity for adhering to the provisions of the ESA, the penalties associated with violating the provisions of the ESA, the specific measures that are incorporated into the description of the proposed action to avoid and (or) minimize the adverse effects to these species, and a description of the area within which project activities may occur.

- If more than one El Segundo blue butterfly or two California red-legged frogs are found dead or injured, or more than two seasonal wetlands occupied by the vernal pool fairy shrimp are destroyed during construction of the CSC, the Air Force must contact our office immediately so we can review the project activities to determine if additional protective measures are needed. If, after construction is complete, more than three California red-legged frogs are killed or injured annually as a result of Space Center operations, the Air Force must contact our office immediately so we can review the project activities to determine if additional protective measures are needed. The cause of death or injury must be determined by a USFWS-approved biologist. Project activities likely to result in take must cease during this review period.

- The CSA must use USFWS-approved biologists to conduct pre-activity surveys for California red-legged frogs and El Segundo blue butterflies during construction of the CSC. Pre-activity surveys for California red-legged frogs must occur daily during the wet season. If a juvenile or adult California red-legged frog is located in the action area, the biologist must relocate it to nearby suitable

habitat out of harm's way and within the same watershed.

- In coordination with the Air Force, the CSA must request USFWS approval of any biologists it wishes to employ to monitor for, capture, and relocate California red-legged frogs from the work area, and to conduct monitoring activities for the El Segundo blue butterfly or vernal pool fairy shrimp. The request must be made to the Service at least 15 days prior to any such activities being conducted by the biologist(s).

Other Measures for Protection of Biological Resources

The following measures would avoid or minimize potential adverse effects to biological resources during implementation of the Proposed Action.

- All human generated trash at the project area would be contained and removed from the work site and properly disposed of frequently. All construction debris and trash would be removed from the project area upon completion of the project.

- Appropriate erosion, sediment, and water runoff control measures would be used to prevent degradation of wetlands outside the proposed project area and to minimize impacts to wetland areas within the proposed project area that are slated for preservation.

- A schedule of planned construction activities would provided to a VAFB Biologist and Botanist.

- In late spring/early summer, prior to construction, surveys would be conducted for special status plants. If special status plant species are documented, a section 7 consultation under the ESA with the USFWS would be required to be completed prior to the start of construction.

- In late spring/early summer, prior to construction, focused surveys for Vandenberg monkey flower would be conducted. If documented, measures to minimize adverse effects would be discussed with the VAFB Botanist.

- The plant palette (ornamental and native species) would comply with VAFB's approved plant list to prevent the introduction or further proliferation of invasive or potentially injurious species.

- If possible, vegetation clearing would take place outside of the February to August nesting period to minimize impacts to nesting native birds. If this time period cannot be avoided, a qualified biologist would perform pre-activity surveys to document active nests (with eggs or unfledged young) within the project area and to implement appropriate actions to minimize or avert adverse effects (e.g., maintain nest intact until all young have fledged).

4.2.3 No-Action Alternative

Under the No-Action Alternative, activities associated with the construction and operation of the CSC would not occur within the proposed project area on VAFB, and biological resources would not be affected by project activities. However, the No-Action Alternative would not meet the purpose and need of the proposed project.

4.3 Cultural Resources

4.3.1 Proposed Action

The CSA, in cooperation with the 30 SW of the Air Force, VAFB, carried out a reasonable and good-faith effort to identify historic properties within the proposed undertaking's area of potential effects. That effort is documented in *Archaeological Survey and Isolated Artifact Testing for the Proposed California Space Center, Vandenberg Air Force Base, Santa Barbara County, California* (Enright and Lebow 2009). No historic properties were identified. As such, VAFB's federal agency Section 106 determination for the proposed undertaking is no historic properties affected. The California State Historic Preservation Officer (SHPO) concurred with this finding on July 30, 2009 (OHP file reference # USAF090720A).

4.3.2 No-Action Alternative

Under the No-Action Alternative, the CSC would not be constructed and no consequences for cultural resources would result. However, the No-Action Alternative would not meet the purpose and need of the proposed project.

4.4 Earth Resources

Factors considered during evaluation of the environmental consequences of the Proposed Action and the No-Action Alternative on earth resources include seismicity, structural damage, tsunamis, surface fault ruptures, and liquefaction.

4.4.1 Proposed Action

Construction activities associated with the proposed construction of the CSC would not include extensive excavation or intrusive activities such as blasting. Therefore subsurface geology and soils would not be adversely affected. Surface fault ruptures during a seismic event are not expected to have a direct effect on the proposed project area because no faults transverse the site (Alterman et al. 1994).

Construction of the proposed CSC would require the removal of vegetation and disturbance of soil during grading, road construction, and installation of foundations and underground utilities. These activities typically loosen the soil and tend to promote erosion during periods of wind or rainfall. Because soils in the vicinity of the proposed project area are subject to high wind erosion, appropriate sediment and soil control techniques would be used to minimize soil loss. Landslides, which are most common in steep-sloped areas, are not likely to occur within the proposed project area because it is mainly flat. In summary, effects on earth resources would be less than significant.

4.4.2 No-Action Alternative

Under the No-Action Alternative, the CSC would not be constructed or operated. Thus, earth resources would not be affected by project activities. However, the No-Action Alternative would not support the purpose and need for the proposed project.

4.5 Hazardous Materials and Waste Management

Potential impacts as a result of hazardous materials and waste are evaluated using federal, state, and local regulatory requirements, and contract specifications. Hazardous materials management requirements are found in federal and state EPA and OSHA regulations, as well as contract specifications and the CSA CSC Hazardous Materials Management Plan (CSA 2009b). Hazardous waste management requirements are found in federal, state, and local regulations, and contract specifications. Non-compliance with applicable regulatory requirements, human exposure to hazardous materials and wastes, or environmental release above permitted limits, would be considered adverse impacts.

4.5.1 Proposed Action

Compliance with all applicable federal, state, and local regulations, rules and requirements, and the CSA CSC Hazardous Materials Management Plan (CSA 2009b) would govern all actions associated with implementing the Proposed Action, and would minimize the potential for adverse effects. Hazardous materials and waste management regulations required by federal, state, and local laws and regulations would be followed.

Implementing the Proposed Action would require the use of hazardous materials. As described in Chapter 3, Section 3.5, hazardous materials present during construction activities would be the same types and quantities as those typically used and managed during general construction

projects. Hazardous materials on site once the CSC was operational would be typical of office and school environments. Additionally hazardous materials associated with an equipment assembly capability, such as solvents, epoxies and adhesives, primers, and liquid nitrogen would be present.

Potential adverse effects could result from accidental releases of POLs from vehicle and equipment leaks. All hazardous wastes would be properly managed and disposed of in accordance with applicable federal, state, and local hazardous waste regulations. All hazardous wastes would be managed during release response and clean-up. With the implementation of the measures described in Section 4.5.2 below, impacts resulting from hazardous materials and waste management would be less than significant.

4.5.2 Environmental Protection and Minimization Measures

Implementation of the environmental protection and minimization measures outlined below should avoid or minimize potential adverse effects to hazardous materials and waste management during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented.

Strict compliance with all applicable federal and state statutes and regulations, as well as local support plans and instructions, including CSA CSC Hazardous Materials Management Plan (CSA 2009b), would avert the potential for adverse impacts to the environment as a result of potential generation of hazardous materials and waste during implementation of the Proposed Action.

Implementing the measures presented below should further minimize the potential for adverse impacts from hazardous materials or waste.

- All hazardous materials required to operate and maintain construction equipment, or used in an equipment assembly capability, would be properly identified and used in accordance with manufacturer's specifications to avoid accidental exposure or release.
- Standard procedures would be used to ensure that all equipment is maintained properly and free of leaks during operation, and that all necessary repairs are carried out with proper spill containment. A Spill Prevention Plan would be submitted to 30 CES/CEA for approval.
- The CSA CSC Hazardous Materials Management Plan would be submitted to 30 CES/CEA for approval.
- Hazardous materials would be properly stored and managed in secured areas.
- Hazardous materials would be procured through or approved for use by the 30th Civil Engineer Squadron Asset Management Flight, Pollution Prevention and Sustainment Office (30 CES/CEANP).
- Chemical stockpile spill containment, if necessary, would be accomplished to minimize or preclude hazardous releases.
- All equipment and holding tanks would be staged, repaired, and maintained in pre-designated areas. Fueling and addition of oil/fluids to equipment would be done in pre-designated, controlled surfaces to minimize risks from accidental spillage or release. Spill containment material would be placed around the equipment before fuels, or other hazardous substances such as oil or brake fluid, are brought in.
- Hazardous wastes generated by construction or during CSC operation would be properly contained, stored, and disposed of.

4.5.3 No-Action Alternative

Under the No-Action Alternative, the construction and operation of the CSC on VAFB would not be implemented and, therefore, there would be no change in the management or levels of hazardous materials and waste. However, the No-Action Alternative would not meet the purpose and need of the proposed project.

4.6 Human Health and Safety

4.6.1 Proposed Action

Potential adverse effects to human health and safety could occur during construction of the CSC. During operation of the CSC, potential adverse effects are not anticipated, as the environment would be similar to that of a business park, educational center, and events center. Compliance with OSHA regulations and other recognized standards would be implemented during construction of the CSC. A health and safety plan would be developed and a formally-trained individual would be appointed to act as safety officer. The appointed individual would be the point of contact on all problems involving job site safety. During performance of construction work, all provisions and procedures prescribed for the control and safety of personnel and visitors to the job site, would be implemented. Therefore, human health and safety would not be adversely impacted by general construction-related hazards.

Once the CSC is operational, it would provide the public with a safe location from which to view rocket launches. The CSC would decrease safety hazards associated with public viewing at public locations, such as along Hwy 1, SR 246, or the Harris Grade Road, and thereby increase public safety during these events.

With the implementation of the environmental protection and minimization measures outlined in Section 4.6.2, potential health risks to project personnel and the public should be minimal, if any.

Potential Hazards

Physical hazards typical of any outdoor environment, including holes or ditches, uneven terrain, sharp or protruding objects, slippery soils or mud, and biological hazards including vegetation (i.e. poison oak and stinging nettle), animals (i.e. insects, spiders, and snakes), and disease vectors (i.e. ticks and rodents), exist at and near the proposed project area, and have the potential to adversely impact the health and safety of project personnel during construction. Adherence to federal OSHA regulations should minimize the exposure of workers to these hazards.

Unexploded Ordnance

Special precautions need to be taken in certain areas of VAFB that were used as practice ranges for artillery firing, referred to as areas of potential UXO. Coordination with the EOD Flight prior to the start of construction under the Proposed Action should ensure no adverse effects on human health and safety occur.

Noise

According to regulations of the federal OSHA, employees should not be subjected to sound exceeding a L_{eq1H} of 90 dB for an 8-hour period. This sound level increases by 5 dB with each halving of time (e.g., 4-hour period at 95 dB). Exposure up to a L_{eq1H} of 115 dB is permitted for a maximum of only 15 minutes during an 8-hour workday and no exposure above 115 dB is permitted. For this analysis, OSHA standards are used as the "not to exceed" criteria as they are the most appropriate standards available.

Construction activities under the Proposed Action would temporarily increase the ambient noise levels within the proposed project area and in neighboring areas during project implementation activities. Relatively continuous noise would be generated by construction equipment. These continuous noise levels are generated from equipment that have source levels (at 1 meter) ranging from approximately 72.7 to 112.7 dB. As a sound source gets further away, the sound level decreases. This is called the attenuation rate. These rates are highly dependent on the terrain over which the sound is passing and the characteristics of the medium in which it is propagating. The rate used in these estimates was a decrease in level of 4.5 dB per doubling of distance. This average rate has been shown to be an accurate estimate from field data on grassy surfaces (Harris 1998). At 50 meters these levels range from 47.3 to 87.3 dB. Adverse

effects as a result of noise are expected to be minimal and less than significant.

Once the CSC became operational, noise environments are anticipated to be similar to office parks and schools, with the exception of amphitheater events, such as live performances, and films. Because the CSC would be located 1.0 mile from the nearest buildings (in the VAFB cantonment) and 1.4 miles from the nearest developed housing area (VAFB housing near Main Gate), adverse effects as a result of noise from these events are expected to be minimal and less than significant.

4.6.2 Environmental Protection and Minimization Measures

Implementation of the environmental protection and minimization measures outlined below should avoid or minimize potential adverse effects to human health and safety during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented.

- To provide for the health and safety of workers and visitors who may be exposed to hazards during construction and operation of the CSC, federal OSHA, and if applicable, California OSHA requirements would be implemented, and a Health and Safety Plan would be developed and implemented.

- Coordination with the EOD Flight would occur prior to the start of construction.

- To minimize the potential adverse impacts from biological (e.g., snakes and poison oak) and physical (e.g., rocky and slippery surfaces) hazards during construction, awareness training would be incorporated into the worker health and safety protocol.

4.6.3 No-Action Alternative

Under the No-Action Alternative, the proposed CSC would not be constructed or operated and, therefore, there would be no impacts to human health and safety. However, the No-Action Alternative would not meet the purpose and need for the proposed project.

4.7 Land Use and Aesthetics

Factors considered in the evaluation of the environmental consequences of implementing the Proposed Action and No-Action Alternative for land use and aesthetics include:

- Public accessibility to recreational areas in the vicinity of the proposed project area

- Restriction to development of facilities on VAFB

- Potential for a decrease in available agricultural lands near the project area

4.7.1 Proposed Action

The construction and operation of the CSC under the Proposed Action would not result in a conversion of prime agricultural land or cause a decrease in the utilization of land. Construction also would not result in restrictions to development of facilities or activities associated with the VAFB mission. The project is not expected to adversely affect recreation. It is anticipated that the CSC would provide additional opportunities to the public for recreational activities within its picnic area and at the amphitheater.

Aesthetically, the site may appear as a natural area to drivers on Hwy 1 because the pads and roads within the abandoned trailer park are not readily visible from the highway. The only signs of the previously existing development are the access road to the site and the power lines. Development of the site might be considered by some as detrimental to the viewshed. However, because the site was previously developed and abandoned, its re-development would enhance the site itself.

No adverse impacts to open space land surrounding the proposed project area are anticipated because all construction activities would occur within the boundaries of previously developed area, and all access

and transportation would be accomplished through existing paved and unpaved roadways. In summary, no adverse effects are anticipated.

4.7.2 No-Action Alternative

Under the No-Action Alternative, the proposed CSC would not be constructed or operated, and therefore, there would be no impacts to land use and aesthetics. However, the No-Action Alternative does not meet the purpose and need for the proposed project and would result in the now abandoned trailer park remaining in its current condition, which would be a negative effect on the aesthetics of the site.

4.8 Socioeconomics

The analysis of the economic impacts from the construction and operation of the CSC is summarized from *The California Space Center, Santa Barbara County, California, Economic Impact Study* (Productive Impact, LLC 2008). An economic impact study analyzes the increased dollars, flowing from the project or business venture being studied, into the local area.

The most frequently studied economic impacts can be divided into three separate categories. **Total Economic Impact** is the increased value of goods and services resulting from the construction and operation of a project. **Job Creation** is the second category, and is often seen as the most concrete measure of economic impact. The third category is **Tax Revenues**, as generated by the facility, which is typically of interest to public officials.

Total economic impact is analyzed by studying the direct, indirect, and induced impacts of a project. For the CSC project, direct economic impacts would include money spent by construction and operations via employee payrolls and goods/services procured in the region, such as visitor expenditures at local businesses from hotels and restaurants, to gift shops, gas stations, and other retail establishments. Indirect and induced economic impacts would also occur. Indirect economic impacts would occur when a business directly involved in the construction or operation of the CSC purchases goods or services from another business in the area, resulting in additional economic activity. Induced economic impacts result from owners and employees of firms spending their paychecks on goods and services locally. These “ripple effects” would further broaden the impact of the CSC on the regional economy. Total economic impact can also be analyzed by looking at the industries experiencing the greatest impact.

Job creation can also be analyzed as direct, indirect, and induced effects. Direct jobs would be jobs created by the project. Indirect jobs would be jobs created by vendors because of increased spending from the project. Induced jobs would be created by employee paychecks being spent in the local economy. Job creation can also be analyzed by looking at the industries experiencing job growth.

Tax revenues can be analyzed by looking at the taxes generated by the construction and operation the CSC. Federal taxes such as corporate profit taxes, business taxes, personal taxes, and social insurance taxes all play a part in overall tax revenues. These taxes also apply at state and local levels. For projects that create high numbers of jobs, the bulk of the taxes generated are typically from payroll and social insurance contributions.

The analysis of potential social effects from the construction and operation of the CSC is derived from the demographics data presented in Section 3.8, which focuses on the communities (Santa Maria and Lompoc) that would be most affected by the proposed project due to their close physical location. Social aspects covered in this analysis include potential changes to the demographics of the affected communities and potential indirect effects on these communities. However, the demographics of the affected communities are also affected by the economic trends. The implementation of

a project such as the CSC during a time period when the population is in decline could result in additional jobs being available and a reversal of that trend. Likewise, during periods of population influx into an area, the presence of additional job opportunities could result in a greater rate of population increase, which could stress the housing market as well as the infrastructure present in a community. Another aspect to be considered is the existing office space vacancy rate. During periods of high vacancy rate, the establishment of a new business venture that includes additional available office space, can have a negative effect on the existing community.

4.8.1 Proposed Action

Overall, the Proposed Action is anticipated to have beneficial effects on the socioeconomic environment of the area. Job creation and tax revenues would increase significantly. However, depending upon the economic outlook and demographic trends of local communities at the time full build out is completed, there is also a potential that the increased number of workers and visitors to the area could stress the infrastructure of the local communities, if they have not grown accordingly.

Social Aspects

The social effects resulting from the construction and operation of the CSC on the local communities (Santa Maria and Lompoc) are highly dependent upon the economic outlook of the region during the various periods when construction and operation would occur. While the addition of job opportunities could be viewed as a positive factor for communities with high unemployment rates, the addition of office space for those jobs could also result in a negative local effect by increasing the office vacancy rate.

Under the current outlook for Santa Maria and Lompoc, it is anticipated that the construction phases of the CSC would be beneficial for the affected populations by providing job opportunities for the construction workforce in the area. If realized, this would result in a positive outlook for retaining population, with the ripple effects on the local businesses as a result of retained retail sales and continued expenditures by local workers.

Operation of the CSC could result in different scenarios, depending on trends at the time full build out was completed. If local trends continue to indicate high unemployment and high office vacancy rates, with a fairly stable population, then the availability of additional office space could be detrimental if local businesses were to move into new office space created at the CSC. It is anticipated that while some businesses currently located in Santa Maria and Lompoc may move to the CSC, other businesses moving into the CSC would be recruited from outside of the local area, increasing local populations. During a declining market, such as the 2009/2010 market, this would result in increased housing occupancy and increased local retail sales, further enhancing the local business outlook.

If the outlook were to be significantly different than the current one, with decreased unemployment and office vacancy space, the effects of the CSC would be substantially different. In this case, additional office space would be viewed as a positive outcome for both local and out of the area businesses attempting to establish their presence in the communities. The availability of additional jobs could result in an influx of new workers into the affected communities, which in turn, could stress the infrastructure for existing housing and services, such as emergency (fire and police) services, hospitals, and schools.

However, the increased job opportunities resulting from the operation of the CSC would have a beneficial effect on unemployment rates. It is anticipated that operation of the CSC Visitor Center would directly result in 183 new jobs for services such as maintenance, ticket booth operators, food services, and administrative support. The segment of the population that would benefit the most the jobs created at the Visitor Center

would include individuals without a Bachelor's or professional degree.

Also influencing these potential effects would be the significance of the estimated 200,000 to 500,000 annual visitors. While many of these visitors are anticipated to be school groups, there would be many visitors coming from outside the area, putting additional pressure on existing emergency and health (hospital) services, as well as on hotel space, tourist attractions (i.e., local parks and beaches, museums), and recreational opportunities. The increased tourism to the local area could result in increased hotel occupancy and increased hotel room availability (new construction), bringing about a new set of potential issues or concerns for the local communities

Other social aspects to consider are the educational and recreational opportunities that would be offered by the CSC. The CSC would provide educational programs for school groups, as well as for adults, and be a venue for other groups to sponsor educational events, increasing the opportunities offered to the local communities. The presence of a picnic area and amphitheater would also increase the opportunities for local community involvement in recreational activities.

Total Economic Impact

The total economic impact anticipated from the construction of the CSC is $318.7 million; not surprisingly, construction-related industries account for the greatest impact. Over the 9-year period in which the three phases of construction would occur, the local economy would experience an average economic boost of $35.4 million per year from the construction of the CSC alone.

It should be noted that the Mission Support Complex would have a larger impact than all of the other elements of the CSC combined (not including the economic impact of the proposed conference center). At full occupancy, with employees expected to be engineers and scientists, technicians, supervisors and managers, production workers, professional support, and administrative assistants, the economic impact of the complex is estimated at $280 million. The total economic impact of the complex between its inception and the year 2020 would be almost $1.7 billion.

To estimate total economic impact on the local economy, this analysis was separated into two components, the construction itself, and the first 10 years of operation of the CSC. Impact of operations is estimated from the operating expenditures of the CSC and the local expenditures by visitors. Results, as summarized in Table 4-7, show that the total economic impact of the CSC between the years 2008 and 2020 would total $2.37 billion.

The total economic impact is more than ten times the estimated $174.9 million cost to construct the facility. On this basis alone, the CSC represents a sound investment in the economic vitality of the area around VAFB.

Job Creation

The CSC is anticipated to be a major contributor of jobs to local communities. A

Table 4-7. Total direct, indirect, and induced economic impact of the CSC between 2008 and 2020.

	Construction	Operations	Visitors	Total
Direct Economic Impact	188,715,517	1,089,193,191	69,870,303	1,347,779,011
Indirect Economic Impact	47,036,172	361,205,853	18,050,139	426,292,165
Induced Economic Impact	82,914,804	487,752,999	24,520,024	595,187,827
Total Economic Impact	**318,666,493**	**1,938,152,044**	**112,440,466**	**2,369,259,003**

Source: Productive Impact LLC, 2008

Total Tax Revenues Generated

Total taxes generated by federal, state, and local taxes from the construction and operation of the CSC would total $335.6 million from 2008 through 2020. This number includes $23.8 million in property taxes. The largest element of taxes would be federal and state personal income tax of $107.8 million and Social Security contributions of $115 million. At full build out, tax revenues from the Mission Support Complex alone would be $38.4 million per year, which would continue to rise at least with the rate of inflation.

Additional details on total economic impact, job creation, and total tax revenues can be found in *The California Space Center, Santa Barbara County, California, Economic Impact Study* (Productive Impact, LLC 2008).

4.8.2 No-Action Alternative

Under the No-Action Alternative, the proposed CSC would not be constructed or operated. The existing socioeconomic environment would remain unchanged; consequently, the highly beneficial effects anticipated from the presence of the CSC, would not be realized. Additionally, the No-Action Alternative would not meet the purpose and need for the proposed project.

4.9 Solid Waste Management

Solid waste impacts are evaluated using federal, state, and local regulatory requirements, permit conditions, and contract specifications. Adverse impacts would occur from non-compliance with applicable regulatory requirements or an increase in the amount of waste disposed of that would exceed available waste management capacities.

4.9.1 Proposed Action

C&D Debris

Solid waste generated during construction would include packaging from materials (cardboard and plastic), scrap rebar, wood, pipes, and wiring, asphalt and concrete from demolition of existing features, and miscellaneous waste generated by onsite construction workers. Contractors would be responsible for the disposal and/or recycling of all waste generated during the scope of the project.

All soil excavated during construction activities would be used as backfill, and any excess materials would be spread throughout the site. Asphalt and concrete would be recycled when possible, and disposed of at the CSML if necessary.

Construction debris, along with green waste, used tires and other recyclable materials, would be segregated and diverted for reclamation. All green waste would be disposed of at an appropriate facility. For the minor demolition that would occur under the Proposed Action, the demolition contractor would meet the applicable state or local diversion requirements in effect at the time of actual disposal.

Because demolition activities associated with the Proposed Action would be minimal and construction activities would be implemented over a 9-year period, the addition of the solid wastes associated with the Proposed Action would result only in small increases in the amount of solid waste generated locally. The amount of solid waste generated is not anticipated to affect the daily maximum waste that the CSML can accept. With the implementation of the environmental protection and minimization measures in Section 4.9.2, the Proposed Action would have no adverse impacts on the environment.

Pollution Prevention

The evaluation of potential P2 impacts includes consideration of solid waste diversion requirements. Construction operations associated with the Proposed

Action would create pollution in the air and water and would generate hazardous and solid waste. Non-compliance with applicable regulatory requirements or disposal of quantities of solid waste that would cause the proposed project not to meet mandated diversion rates would be considered an adverse impact. Debris would be segregated to facilitate subsequent P2 options. P2 options would be exercised in the following order: reuse of materials, recycling of materials, and then regulatory compliant disposal.

Compliance with all applicable federal, state, and local regulations, rules, and requirements, would govern all actions associated with implementing the Proposed Action and minimize the potential for adverse effects. Implementing the measures presented below, along with those detailed in the air and hazardous materials and waste management sections of this document, would ensure no significant adverse impacts for solid waste would occur.

4.9.2 Environmental Protection and Minimization Measures

Implementation of the environmental protection and minimization measures outlined below should avoid or minimize potential adverse effects to solid waste management during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented.

- Segregating and separately managing the different types of waste during the demolition processes would reduce the amount of solid waste disposal.
- Segregating and processing the different types of demolition debris into sizes, characteristics, and specifications identified by local recyclers as acceptable to their authorized processes would reduce solid waste disposal.

For purposes of attaining LEED certification, and at the discretion of CSA direction, the following measures could also be implemented.

- The contractor shall use specified materials with recycled and recovered content as the minimum standard, which shall be considered when evaluating recycled or reused materials as part of the contractor's affirmative procurement program.
- The contractor shall also consider other green materials and products not listed, but commonly used in industry as a means of further reducing hazardous materials, hazardous waste, and solid waste. The contractor shall make sure these materials and products meet the requirements of their contract specifications.
- In addition, EO 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*, requires the use of products which have reduced toxicity and hazardous characteristics or reduced embodied energy in its manufacturing.

4.9.3 No-Action Alternative

Under the No-Action Alternative, the proposed CSC would not be constructed or operated. Solid waste levels and management, as well as pollution prevention, would not be affected under this alternative. However, the No-Action Alternative does not meet the purpose and need for the proposed project.

4.10 Transportation

The following text, summarized from the Traffic Study (ATE 2009), describes the applicable thresholds from the three relevant jurisdictions for the Proposed Action. It also summarizes the results of the analysis performed to assess impacts on transportation resources from the Proposed Action.

Caltrans Standards

Hwy 1 and SR 246 are controlled and maintained by Caltrans for highway use purposes. Caltrans has established LOS goals for Hwy 1 and SR 246 in their respective Transportation Concepts Reports. These reports target an LOS C as the minimum operating standard for both Hwy 1 and SR 246.

Santa Barbara County Thresholds

All intersections discussed later in this section and previously described in Chapter 3, Section 3.10, with the exception of the H Street/Central Avenue intersection, fall under Santa Barbara County jurisdiction for maintenance and use as roads or highways.

Santa Barbara County thresholds would be exceeded if:

- The addition of project traffic to an intersection increases the (V/C) ratio by the values listed in Table 4-8. If the ratio is exceeded then it is considered a significant project-specific impact.

Table 4-8. Santa Barbara County significant changes in LOS.

Intersection LOS (including Project)	Increase in (V/C) or Trips Greater than
LOS A	0.20
LOS B	0.15
LOS C	0.10
LOS D	15 Trips
LOS E	10 Trips
LOS F	5 Trips

- The project's access to a major road or arterial road would require access that would create an unsafe situation, a new traffic signal, or major revisions to an existing traffic signal.

- The project adds traffic to a roadway that has design features (e.g. narrow width, roadside ditches, sharp curves, poor sight distance, inadequate pavement structure) that would become a potential safety problem with the addition of project traffic.

- The project would utilize a substantial portion of an intersection's capacity where the intersection is currently operating at acceptable LOS (A-C) but with cumulative traffic would degrade to or approach LOS D (V/C 0.80) or lower. Substantial is defined as a minimum change of V/C 0.03 for an intersection which would operate from V/C 0.80 to 0.85, a change of V/C 0.02 for an intersection which would operate from V/C 0.86 to 0.90, and a change of V/C 0.01 for an intersection which would operate at greater than V/C 0.90.

Pursuant to the Highway Capacity Manual's operations analysis method for intersections, LOS for the study area intersections are determined based on the average number of seconds of delay per vehicle.

City of Lompoc Thresholds

The H Street/Central Avenue intersection is located within the City of Lompoc. As stated in the City of Lompoc General Plan, the City's traffic impact threshold is, "The City shall maintain intersection traffic LOS at LOS C or better throughout the City, with the exception of intersections monitored in accordance with the Congestion Management Program (CMP) administered by the Santa Barbara County Association of Governments. CMP intersections shall maintain a LOS in accordance with the most recent CMP standards, when it can be demonstrated that all feasible mitigation measures have been applied to the project and LOS C, with said mitigation, cannot be achieved."

4.10.1 Proposed Action

During construction of the CSC, increases to traffic would occur as a result of commuting by construction workers and the trucks transporting materials and equipment for activities associated with the construction. Construction workers are anticipated to commute from within a 30-mile radius of the Base (from Lompoc/Santa Maria areas). Parking for construction vehicles would be at

a designated area within or adjacent to the proposed project area.

Numerous truck trips on roads and highways in the vicinity of the proposed project area would be required to transport large quantities of material to the project site. These activities would be coordinated with Caltrans to ensure authorization of truck travel routes. A traffic control plan would be developed in coordination with the California Highway Patrol (CHP), and implemented to adequately facilitate the movement of traffic. The traffic control plan would cover all conditions to be encountered during construction.

In the Traffic Study (ATE 2009), existing and predicted traffic levels with project implementation were analyzed. Because the construction of the CSC would occur in three main phases, and facilities would be occupied in phases as well, potential impacts to transportation resources were also analyzed for each of the relevant phases (1 through 3).

- Existing
- Year 2012
- Year 2012 + Project Phase 1
- Year 2015
- Year 2015 + Project Phase 2
- Year 2018
- Year 2018 + Project Phase 3

The operation of the CSC is expected to increase the ADT, due to trips by employees and visitors to the CSC. Table 4-9 summarizes CSC trip generation. An expanded table with additional details can be found in ATE 2009.

Table 4-9. CSC trip generation.

Phase	ADT Trips	AM Peak Hour Trips	PM Peak Hours Trips
Phase 1 Year 2012	2,174	263	290
Phases 1 + 2 Year 2015	3,249	373	432
Phase 1 + 2 + 3 Year 2018	4,674	570	617

Year 2012 Roadway and Intersection Analysis

Roadway operations that exceed LOS threshold levels in 2012 include SR 246 east of Purisima Road. An LOS D is predicted for this roadway both with and also without the construction of the CSC. The construction of the CSC does not change the predicted LOS; it remains a LOS D. Hwy 1 is predicted to operate at an LOS A or B, with or without the operation of the CSC.

In regards to intersection operations, Table 4-10 details intersections where an LOS C would be exceeded with the operation of the CSC. At all four intersections, the operation of the CSC is anticipated to cause a change from the 2012 LOS baseline.

Table 4-10. Intersections predicted to exceed threshold levels in 2012.

Intersection	AM or PM Delay	2012 Baseline LOS	2012 LOS with CSC
Hwy 1/Santa Lucia Canyon Road	AM	D	F
Hwy 1/Vandenberg Road/Casmalia Road	PM	D	E
Hwy 1/Azalea Way	PM	N/A	E
H Street/Central Avenue*	PM	C	D

* indicates intersection is within City of Lompoc.
N/A = Not Applicable

Year 2015 Roadway and Intersection Analysis

As in 2012, roadway operations that exceed LOS threshold levels include SR 246 east of Purisima Road. Again, an LOS D is predicted for this roadway both with and without the construction of the CSC. Hwy 1 is predicted to operate at an LOS A or B, with or without the operation of the CSC.

Table 4-11 details the intersections where an LOS C would be exceeded in 2015. At three of the five intersections the operation of the CSC is anticipated to cause a change from the 2015 baseline.

Table 4-11. Intersections predicted to exceed threshold levels in 2015.

Intersection	AM or PM Delay	2015 Baseline LOS	2015 LOS with CSC
SR 246/Purisima Road	AM	D	D
Hwy 1/Santa Lucia Canyon Road	AM/PM	E/C	F/D
Hwy 1/Vandenberg Road/Casmalia Road	PM	D	E
Hwy 1/Azalea Way	PM	N/A	F
H Street/Central Avenue*	PM	D	D

* indicates intersection is within City of Lompoc.
N/A = Not Applicable

Year 2018 Roadway and Intersection Analysis

As in 2012 and 2015, roadway operations that exceed LOS threshold levels include SR 246 east of Purisima Road. Again, an LOS D is predicted for this roadway both with and without the construction of the CSC. The construction of the CSC does not change the predicted LOS; it remains a LOS D. Hwy 1 is predicted to operate at an LOS A or B, with or without the operation of the CSC.

Table 4-12 details the intersections where an LOS C would be exceeded in 2018. At half of the six intersections, the operation of the CSC is anticipated to cause a change from the 2018 baseline.

Table 4-12. Intersections predicted to exceed threshold levels in 2018.

Intersection	AM or PM Delay	2018 Baseline LOS	2018 LOS with CSC
SR 246/Purisima Road	AM	E	E
Hwy 1/Santa Lucia Canyon Road	AM/PM	F/C	F/E
Hwy 1/Vandenberg Road/Casmalia Road	PM	D	E
Hwy 1/Azalea Way	PM	N/A	F
H Street/Central Avenue*	PM	D	D
Hwy 1/Harris Grade Road/Purisima Road	PM	D	D

* indicates intersection is within City of Lompoc.
N/A = Not Applicable

Launch Day Event Analysis

Launch day events are anticipated to occur two to nine times a year during launches from VAFB, with most occurring in the early morning or late evening hours, and not during peak travel periods. Up to 2,000 visitors are anticipated to attend these events. The day-to-day traffic level at the CSC is anticipated to be 3,790 ADT, with an additional 1,320 ADT for launch events, totaling 5,110 ADT. Arrival and departure in the immediate vicinity during these events is expected to result in congestion, a potentially significant impact.

Onsite Circulation and Parking Analysis

The planned onsite circulation system was analyzed and found to provide ample area for traffic and pedestrian circulation.

Under the Proposed Action, 1,669 parking spaces are anticipated to be built to meet day-to-day parking needs, along with 255 spaces available as overflow parking. It is anticipated that the operation of the CSC would generate a peak parking demand for 1,582 parking spaces on a day-to-day basis (ATE 2009), which would be met by the planned spaces.

For launch day events, parking was calculated (assuming an average of three visitors per vehicle) at a total parking demand for 1,932 spaces. The 1,669 parking spaces plus the additional 255 overflow parking spaces generate a total of 1,924 spaces, leading to a deficit of eight spaces.

Construction of the proposed CSC has the potential to result in temporary adverse effects to local traffic and circulation resulting from increased truck traffic to and from the project site. Operation of the CSC also has the potential to adversely affect traffic and circulation at some specific intersections as described above. However, implementing and complying with the environmental protection and minimization measures described in Section 4.10.2 would result in no adverse effects to transportation resources.

4.10.2 Environmental Protection and Minimization Measures

Implementation of the environmental protection and minimization measures outlined below should avoid or minimize potential adverse effects to transportation resources during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented.

- Truck trips would be scheduled during non-peak traffic hours when possible.
- CSA would coordinate with Caltrans and the CHP for the transportation of materials to the project site, and for accessing the project site through Hwy 1.
- Warning signs, cones, and flaggers would be provided if necessary to warn roadway users of truck crossings on Hwy 1, and to control traffic flow.
- Construction equipment would not be parked along the shoulder of Hwy 1 during non-construction periods.
- Project employees would be encouraged to carpool and eat lunch on the site.

In addition to the general construction measures described above, specific improvements to roadways and intersections would be implemented in order to keep roadways and intersections operating at appropriate LOS ratings, as described under the standards and thresholds detailed at the beginning of this resource section. CSA would contribute some percentage financially toward recommended improvements, as agreed upon with Caltrans.

Table 4-13 describes recommended improvements that would reduce LOS impacts to appropriate threshold levels. The year in which the initial improvement is described in the table above , is the year in which the LOS exceeded threshold levels due to project impacts. The calculated percent of the CSC financial contribution for the recommended improvements is also included. CSA would be expected to fund 100 percent of the Hwy 1-Azalea Way intersection improvements. Note that CSA and Caltrans are continuing discussions on appropriate mitigation measures and would work to further define appropriate measures as the project specifics are further developed.

4.10.3 No-Action Alternative

Under the No-Action Alternative, the CSC would not be constructed or operated. Therefore, there would be no effect on existing transportation. However, the No-Action Alternative does not meet the purpose and need for the proposed project.

4.11 Water Resources

Adverse impacts to water resources would occur if the Proposed Action:

- Caused substantial flooding or erosion;
- Adversely affected surface water quality to creeks or rivers; or
- Adversely affected groundwater or water quality to localized water resources.

4.11.1 Proposed Action

The Proposed Action would require coverage under the NPDES Construction General Permit because the total disturbed area would be greater than 1 acre. A SWPPP would be developed and implemented to maintain compliance with the NPDES Construction General Permit. During site preparation and construction activities, storm water BMPs would be implemented during and after any clearing, excavation, and grading. Long-term BMPs would be put in place to address storm water after project completion.

A CWA Section 401 Water Quality Certification from the Central Coast RWQCB and CWA Section 404 Permit from the USACE would also be required under the Proposed Action because direct impacts to water bodies or wetlands would occur.

Table 4-13. Recommended improvements to roadways and intersections to maintain adequate LOS ratings with project implementation.

Roadway Segment or Intersection	Recommended Improvement
SR 246 east of Purisima Road (28% CSA contribution)	2012 - Install passing lane along SR 246 between Lompoc and Buellton. 2012 mitigation brings 2015 and 2018 impacts to appropriate LOS ratings.
Hwy 1/Vandenberg Road/Casmalia Road (45% CSA contribution)	2012 - Restripe northbound approach to contain one left-turn lane, one thru lane, and one right-turn lane eliminating split phasing on north and southbound approaches. Adjust signal timing. 2012 mitigation brings 2015 and 2018 impacts to appropriate LOS ratings.
Hwy 1/Azalea Lane (100% CSA contribution)	2012 - Implement traffic signal as described in the Proposed Action. 2012 mitigation brings 2015 and 2018 impacts to appropriate LOS ratings.
Hwy 1/Santa Lucia Canyon Road (37% CSA contribution)	2012 – Select one of four of the following options: - Install traffic signal, or - Install half signal controlling southbound Hwy 1 flows and turning movements to and from Santa Lucia Canyon Road, or - Install a grade-separated facility (interchange) providing a ramp system for movements to/from Hwy 1 and Santa Lucia Canyon Road, or - Prohibit left turns from Santa Lucia Canyon Road to Hwy 1 and reroute traffic. 2012 mitigation brings 2015 and 2018 impacts to appropriate LOS ratings.
H Street/Central Avenue (13% CSA contribution)	2012 - Install dual left-turn lanes on north and southbound approaches. 2012 mitigation brings 2015 and 2018 impacts to appropriate LOS ratings.
Hwy 1/Purisima Road (28% CSA contribution)	2015 – Select one of the following options: - Reconfigure intersection to a roundabout, or - Change the lane geometries and install traffic signal. 2015 mitigation brings 2018 impacts to appropriate LOS rating.
Hwy 1/Harris Grade Road/Purisima Road (26% CSA contribution)	2018 - Revise southbound approach lane to provide one shared left-thru lane, one thru land, and one right-turn lane.

All permit conditions would be implemented, including SWPPP BMPs and inspections, and the VAFB *Discharge to Grade Program* to minimize the potential for adverse impacts to local water resources. CSA would also coordinate all design, construction, and operational specification of the proposed wastewater treatment system through 30th Civil Engineer Squadron Asset Management Flight, Environmental Quality Office (30 CES/CEANQ) to ensure regulatory requirements are met. With the implementation of these procedures and requirements, adverse effects to water resources would be less than significant, as described below.

4.11.1.1 Surface Water

Construction activities would include the use of hazardous materials that could result in an adverse impact if not properly controlled and managed. The use of POLs during construction poses the potential for releasing pollutants and adversely affecting water resources. Proper management of materials and wastes during construction would reduce or eliminate the potential for contaminated runoff. There would be no discharge of groundwater to surface water. The VAFB *Discharge to Grade Program* would manage wastewater discharges that may occur during project activities, including accumulated storm water. As required by the NPDES Construction General Permit, BMPs would be implemented to properly manage materials, and reduce or eliminate project-associated

runoff to further reduce the potential for adverse effects, especially during the rainy season.

Analysis and Findings

Site hydrology was analyzed using the HydroCad 8.0 modeling application. Due to the preliminary nature of this study, only the 5-, 25-, and 100-year events were evaluated, and analyses of temperature were omitted. The existing site demonstrates relatively high peak flows due to existing impervious area and a poor Natural Resources Conservation Service soil rating. As discussed in Chapter 3, soil borings were performed on site to verify existing soil conditions, groundwater levels, and percolation rates. Percolation rates are presented in Table 3-11. Detailed calculation results are available upon request. Pre-development peak site discharge is summarized in Table 4-14.

Table 4-14. Pre-development peak flows.

Storm Frequency	Area A [cfs]	Area B [cfs]	Area C [cfs]
5-yr	3.2	6.1	8.8
25-yr	7.9	12.8	19.2
100-yr	17.8	17.1	41.0

Note: cfs is cubic feet per second.

Proposed Discharge Methods

A series of vegetated swales and detention basins are proposed to mitigate discharge to the above-listed criteria, with offsite discharge points located to emulate existing conditions. In accordance with Federal standards, unfenced basins would not exceed a maximum ponding depth of 2 feet and maximum side slope of 6:1. Final site design may incorporate fenced basins with an increased ponding depth to meet storage volume requirements. Fencing shall have a minimum height of 42 inches with a double 8-foot wide swing gate. The maximum interior side slope for any fenced basin is 4:1. Basin outlets shall be designed to match pre-development peak flows for all storm events. The design of the vegetated swales shall incorporate a maximum slope of 1 percent, as well as a meandering path where possible to allow for maximum contact with the soil and plant media, providing filtration.

Vegetated swales and detention basins would function as the primary pollutant source control for site runoff. All drainage, including roof drain runoff, is intended to be routed through the basins and swales, providing a low maintenance, natural method of filtration.

The less permeable site soils provide for greater contact time with vegetation and the soil surface, which initiates gravity sediment and associated pollutant settling while concurrently providing biological pollutant uptake. Some dissolved pollutants may also be removed through soil sorption and subsurface infiltration. Low flow swales would be incorporated into basin design, as well as large basin footprints to allow time for settling of fine particles and associated pollutants. Basin outlet design would account for the initial low-flow storm events, commonly known as the first flush. Penfield & Smith Exhibit Two in Appendix A identifies the proposed drainage outlets, basins, and vegetated swales.

In the event that direct tributary discharge to vegetated swales is found to be infeasible during final design, runoff shall be routed to a catch basin connected to a mechanical filtration device designed to provide removal of suspended solids, oils, and grease prior to entering the storm drain system. As these devices require regular maintenance and replacement of the filtration media, these are recommended for use only where natural filtration through a basin is not possible.

Post-construction design measures would be developed during final site design to satisfy federal storm water requirements. These measures shall be designed and implemented to match the pre-development peak flow discharge volume, rate, duration, and temperature. Potential measures include multiple shallow basins, vegetated swales,

and permeable parking. In summary, with the implementation of the design measures and criteria described above, no adverse impacts would result to surface waters.

4.11.1.2 Groundwater

Soil borings were taken on the site, as well as percolation testing, to determine any potential impacts to the groundwater at the site. Onsite soils have low-permeability, thus evapo-transpiration would be the primary disposal mechanism. Per Title 22, CCR, Division 4, Environmental Health, Chapter 3, Water Recycling Criteria, Article 3, Uses of Recycled Water, the following uses are defined as acceptable applications for tertiary treated recycled water:

- Food crops, including edible root crops where the recycled water comes into contact with the edible portion of the crop
- Parks and playgrounds
- School yards
- Residential landscaping
- Unrestricted access golf courses
- Any other irrigation use not specified in this section and not prohibited by other sections of the CCR.
- Non-restricted recreational impoundments

Based on the site soil characteristics, groundwater impacts are not anticipated as a result of the use of recycled water. No groundwater recharge wells or injection sites are currently planned for the site. In accordance with Title 22, any such uses are subject to review by the State Department of Health Services. As such, groundwater recharge wells or injection sites are not recommended for use on this site.

Title 22, CCR, Division 4, Environmental Health, Chapter 3, Water Recycling Criteria, Article 4, Use Area Requirements, specifies the following:

- No irrigation with disinfected tertiary recycled water shall take place within 50 feet of a domestic water supply well unless specific criteria are met.
- No impoundment of disinfected tertiary recycled water shall occur within 100 feet of any domestic water supply well.
- Irrigation runoff shall be confined to the recycled water use area, unless the runoff does not pose a public health threat and is authorized by the regulatory agency.
- Spray, mist, or runoff shall not enter dwellings, designated outdoor eating areas, or food handling facilities.
- Drinking water fountains shall be protected against contact with recycled water spray.
- All areas where recycled water is used that is accessible to the public shall be posted with signs that include the wording "RECYCLED WATER- DO NOT DRINK."

There are no domestic water supply wells located within the specified exclusion zone. Considering the low permeability of site soils, the potential for some irrigation runoff is feasible. However, as the runoff is disinfected tertiary recycled water meeting Title 22 requirements, a threat to public health is not anticipated. Water disposal application, in conjunction with the site layout, would prevent spray from entering dwellings, as well as eating and food preparation areas. Bonneted drinking fountains would prevent direct contact with recycled water spray, and required signage would be posted.

The proposed wastewater treatment system would produce disinfected tertiary recycled water, as defined in Title 22, CCR, which would be disposed of on the site through slow-rate percolation and evapotranspiration in landscaped areas. As the effluent and disposal practices would meet Title 22 disinfected tertiary recycled water criteria, threat to water quality and public health is not anticipated. Site design shall ensure that all provisions of Title 22 are met at the time of construction. A monitoring and sampling plan shall be implemented to ensure that the effluent meets Title 22 disinfected tertiary

recycled water criteria over time. With the implementation of these measures, no impacts to groundwater resources are anticipated.

4.11.2 Environmental Protection and Minimization Measures

Implementation of the environmental protection and minimization measures outlined below should avoid or minimize potential adverse effects to water resources during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented.

Compliance with NPDES Construction General Permit and CWA Section 401 Water Quality Certification conditions should minimize potential adverse impacts to water resources. A SWPPP, approved by 30 CES/CEA, would be developed and implemented prior to initiation of any activities under the Proposed Action. *Discharge to Grade Program* procedures should minimize the potential for adverse impacts to local water resources.

In addition, implementation of the measures described below should further reduce the potential for adverse effects to water resources:

- BMPs, including erosion and sediment control, proper spill prevention practices for all stored liquids and construction vehicles, and permanent erosion control, would be implemented.

- Approval would be obtained from the 30 CES/CEANQ, Water Resources Manager, prior to any release to grade of any water (*Discharge to Grade Program*).

4.11.3 No-Action Alternative

Under the No-Action Alternative, the CSC would not be constructed or operated. Therefore, there would be no effect on water resources. However, the No-Action Alternative does not meet the purpose and need for the proposed project.

4.12 Cumulative Impacts

Adverse cumulative impacts (hereinafter referred to as "cumulative impacts") result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions, regardless of the agency that undertakes these other actions. Cumulative impacts can result from actions whose adverse impacts are individually minor or negligible, yet over a period of time, are collectively significant.

Within the vicinity and region of influence of the proposed CSC facility, projects identified outside of VAFB include:

- Public safety complex at Allan Hancock College (Lompoc) - The public safety complex project involves relocating the Public Safety program from its current facilities at the Allan Hancock College South Campus in the City of Santa Maria to Lompoc. Per environmental documents completed for this project, mitigation measures would be implemented to reduce adverse effects to biological resources, water resources, and air quality to less than significant.

- Frick Springs Bridge Project (Lompoc) – The City of Lompoc is proposing to construct a 12-foot wide, 60-foot long prefabricated metal bridge over San Miguelito Creek, on the west side of San Miguelito Road, approximately 4 miles south of the City of Lompoc. Environmental documents for this project are under development. Resources that are of concern include biological resources, and hydrology and water quality. It is anticipated that any significant adverse effects would be mitigated to a less than significant level.

For VAFB projects, a partial list of projects for which NEPA analysis was completed within the past 5 years, including cumulative impacts analyses, is detailed in Table 4-15. Of these, projects that are currently in progress or will be implemented in the future at VAFB include: demolition and abandonment of Atlas and Titan facilities, restoration of San Antonio Creek, upgrades to Western Range instrumentation, and several projects to occur

Table 4-15. Partial list of projects for which NEPA analysis has been completed in the previous 5 years.

Name of Project	NEPA Analysis Timeframe	Project Timeframe
VTRS Fiber Optic Cable Installation	EA completed in 2004.	Project mostly completed in 2007. See VTRS Supplement below.
Demolition and Abandonment of Atlas and Titan Facilities	EA completed in 2005.	Project on-going.
Combat Information Transport System Upgrade	EA completed in 2006.	Project completed in 2007.
VTRS Supplement	EA completed in 2007.	Project completed in 2008.
New 13th Street Bridge	EA completed in 2007.	Project implementation in flux, currently no earlier than 2011.
San Antonio Creek Restoration	EA completed in 2008.	Project implementation started in 2008 and anticipated to be completed in 2010.
Western Range Instrumentation Upgrades	EA completed in 2008.	Project implementation started in 2008 with anticipated completion in 2010.
2007 General Plan for Main and South Base Cantonments	EA completed in 2008.	Projects to be implemented between 2009 and 2014.
Security Upgrade of Gates	EA completed in 2009.	Project implementation to be completed in 2012.

within the main and south Base cantonments under the Military Construction and non-appropriated funds programs. Future projects for which NEPA analysis is currently underway include: operation of the Falcon 9 and Falcon 9 Heavy programs from SLC-4 East.

Air quality impacts were considered in conjunction with on-going and future projects planned within and outside of VAFB. The cumulative emissions from the Proposed Action and past, present, and future projects on VAFB would not exceed the significance thresholds of 548 pounds/day or 100 tons/year. For those projects outside of VAFB that would have a substantial amount of emissions, mitigation would be implemented to reduce the levels to less than significant. Therefore, no significant cumulative impacts to the region's air quality would occur.

Adverse effects to biological resources under the Proposed Action should be minimized with the implementation of measures described in Sections 4.2.2 of this EA, identified in EAs completed for other projects, to be incorporated in EAs currently under development for future projects, and identified and established by VAFB for operations and maintenance (O&M) projects. With these measures in place, no significant cumulative impacts are anticipated.

The Proposed Action would have no effect on cultural resources. Therefore, no cumulative impacts would occur under this alternative.

No significant impacts to earth resources are anticipated from the Proposed Action, or any of the other projects considered in this analysis. Environmental documentation under development for future projects would identify any potential adverse effects to earth resources and describe measures to avoid or minimize these adverse effects. No cumulative impacts are anticipated.

When considered with other past, present, and future projects on VAFB, the Proposed Action was found to have no cumulative impacts on environmental justice, as activities for the proposed project would occur within VAFB boundaries and not affect minority communities.

Hazardous materials/wastes encountered or generated by the Proposed Action would be managed in strict compliance with all applicable statutes and regulations to avert the potential for adverse impacts. Implementing the measures described in Section 4.5.2 of this EA, identified in the

environmental documents completed for other projects, to be incorporated in environmental documents for future projects, including those identified and established by VAFB for O&M projects, should avoid or minimize any potential adverse effects. No significant cumulative impacts are anticipated.

Given the requirement to comply with federal and state OSHA regulations, and all other applicable federal, state, and local regulations, no adverse impacts and therefore no cumulative impacts to human health and safety are anticipated for the Proposed Action.

No cumulative impacts are anticipated in regards to land use or aesthetics as the Proposed Action would not change land use, result in the conversion of prime agricultural land to other uses, or result in adverse effects.

The Proposed Action may affect some aspects of the socioeconomic environment (emergency services, housing and office space vacancy, and recreational opportunities) depending on the demographic trends at the time of full build out of the CSC. It is anticipated that the Proposed Action would have overall positive effects by providing opportunities for education, new recreational activities, and additional employment, and that it would benefit the overall regional economy. No adverse impacts to socioeconomics and therefore no cumulative impacts are expected under the Proposed Action.

Minimal levels of solid waste are anticipated to occur from construction activities under the Proposed Action. When possible, items would be recycled to the extent possible and any remaining solid waste would be properly disposed of at an appropriate landfill facility, such as CSML. With these measures in place no significant cumulative effects are anticipated from the Proposed Action.

Based on predicted LOS ratings with the implementation of the Proposed Action, and with the implementation of measures described in Section 4.10.2 of this EA, identified in the environmental documents completed for other projects, and to be incorporated in environmental documents for future projects, as well as those identified and established by VAFB for O&M projects, activities covered under the Proposed Action would be unlikely to have significant impacts to the transportation system in the region. No cumulative impacts are anticipated.

All activities under the Proposed Action would be subject to all requirements contained in the NPDES Construction General Permit. Implementation of measures described in Section 4.11 of this EA, identified in environmental documents completed for other projects, to be incorporated in environmental documents for future projects, as well as identified and established by VAFB for O&M projects, should avoid or minimize any potential adverse effects. No significant cumulative impacts to water resources are anticipated.

To ensure that no significant cumulative impacts result from projects on VAFB that occur either concurrently or sequentially, VAFB includes environmental contract specifications and protective measures as necessary in all projects. Preventive measures are identified and defined by resource managers and actions are taken by project proponents and VAFB during the planning process to ensure adverse impacts are minimized, or avoided all together, as projects are reviewed under NEPA. Prior projects are also considered to ensure no levels of acceptable impacts are exceeded.

With these practices in place, and given that all projects on VAFB are designed and implemented to be in full compliance with applicable statutes and regulations, and environmental protection measures are developed in coordination with appropriate regulatory agencies, the activities included under the Proposed Action, in conjunction with other foreseeable projects at VAFB, would not result in significant cumulative impacts.

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Chapter 5. Persons and Agencies Contacted

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Chapter 7. Distribution List

California Coastal Commission, Federal Consistency Review, San Francisco, CA
California Native Plant Society, Los Osos, CA
California Department of Transportation, District 5, San Luis Obispo, CA
Defense Technical Information Center
California Regional Water Quality Control Board, Central Coast Region, San Luis Obispo, CA
Environmental Defense Center, Santa Barbara, CA
La Purisima Audubon Society, Lompoc, CA
Lompoc Public Library, Lompoc, CA
Santa Barbara County Air Pollution Control District, Project Review, Santa Barbara, CA
Santa Barbara Museum of Natural History, Santa Barbara, CA
Santa Ynez Band of Chumash Indians, Tribal Elders Council, Santa Ynez, CA
Santa Barbara Public Library, Santa Barbara, CA
Santa Maria Public Library, Santa Maria, CA
University of California, Library, Santa Barbara, CA
U.S. Fish and Wildlife Service, Ventura Field Office, Ventura, CA
VAFB Library, VAFB, CA

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APPENDIX A:

Engineering Plan Views and Typical Details

CALIFORNIA SPACE CENTER CONCEPTUAL MASTER PLAN

SITE CONTEXT

1. EXTERNAL ROCKET LAUNCH FOUNTAIN
2. CHUMASH VILLAGE
3. NATIVE PLANT GARDEN
4. MISSION SUPPORT GATEWAY
5. CALIFORNIA PLAZA
6. YOUTH EDUCATION COURTYARD
7. PHOTOVOLTAIC
8. SEWER TREATMENT FACILITY
9. MISSION SUPPORT PLAZA
10. PLANET WALK
11. NATURE PATH
12. ADULT EDUCATION COURTYARD
13. OUTDOOR DINING
14. CONFERENCE PLAZA
15. STORM WATER DETENTION POND
16. LAUNCH VIEWING AMPHITHEATRE
17. MARQUEE ENTRANCE SIGN
18. LAUNCH VIEWING PLATFORM
19. SCENIC OUTLOOK
20. ENTRY PLAZA WITH DROP-OFF
21. MEMORIAL MONUMENTS
22. WETLAND PRESERVATION
23. LOADING DOCK
24. CONTROLLED INTERSECTION ENTRANCE/EXIT
25. SECONDARY ENTRANCE/EXIT
26. SECURITY CHECKPOINT

IC - INTERPRETIVE CENTER/MS-1
VC - VISITOR CENTER
MS - MISSION SUPPORT
AEC - ADULT EDUCATION & CONFERENCE CENTER
YE - YOUTH EDUCATION
BH - BACK OF HOUSE OPERATIONS
S - SEWER TREATMENT FACILITY
MS-P1 - MISSION SUPPORT PARKING
MS-P2 - MISSION SUPPORT PARKING (STRUCTURE)
VC-P1 - VISITOR CENTER PARKING
VC-P2 - VISITOR CENTER PARKING
VC-01 - OVERFLOW PARKING AREA

CALIFORNIA SPACE CENTER

WESTBERG + WHITE
ARCHITECTS AND PLANNERS

PHASING & AREA DIAGRAM

- PHASE 0
- PHASE 1
- PHASE 2
- PHASE 3
- VISITOR CENTER
- YOUTH EDUCATION
- ADULT EDUCATION AND CONFERENCE CENTER
- BACK OF HOUSE
- MISSION SUPPORT

CALIFORNIA SPACE CENTER CONCEPTUAL MASTER PLAN

SCALE: 1" = 80'-0"

CALIFORNIA SPACE CENTER

WESTBERG + WHITE
ARCHITECTS AND PLANNERS

UTILITY DIAGRAM

NOTE: DASHED LINES SHOWN ON MAP (LEFT) INDICATE "PLANNED" ROUTES, SOLID LINES INDICATE "EXISTING" ROUTES. BOTH DASHED AND SOLID LINES ARE REPRESENTED BY SOLID LINES IN THE LEGEND BELOW.

- ELECTRICAL LINE
- WATER LINE
- GAS LINE
- DATA/FIBER LINE
- SEWER LINE
- RECLAIMED WATER LINE
- EMERGENCY GENERATOR
- SEPTIC TANK

1. BUILDING MOUNTED SMALL SCALE WIND TURBINE
2. FUELING STATION
3. CENTRAL TRASH/RECYCLING PICKUP
4. FUEL CELL/ALTERNATE ENERGY CENTER
5. PHOTOVOLTAIC ARRAY
6. SEWER TREATMENT
7. RECLAIMED WATER STORAGE POND

CALIFORNIA SPACE CENTER

WESTBERG + WHITE
ARCHITECTS AND PLANNERS

CALIFORNIA SPACE CENTER CONCEPTUAL MASTER PLAN

SCALE: 1" = 80'-0"

CIRCULATION DIAGRAM

1. MISSION SUPPORT SHOP LOADING
2. DROP-OFF/LOADING/UNLOADING
3. SCHOOL BUS STOP
4. LOADING DOCK
5. PUBLIC BUS STOP
6. CONFERENCE LOADING
7. CONFERENCE DROP-OFF
8. VISITOR CENTER COVERED DROP-OFF AREA
9. COVERED WALK
10. CONTROL BOOTH

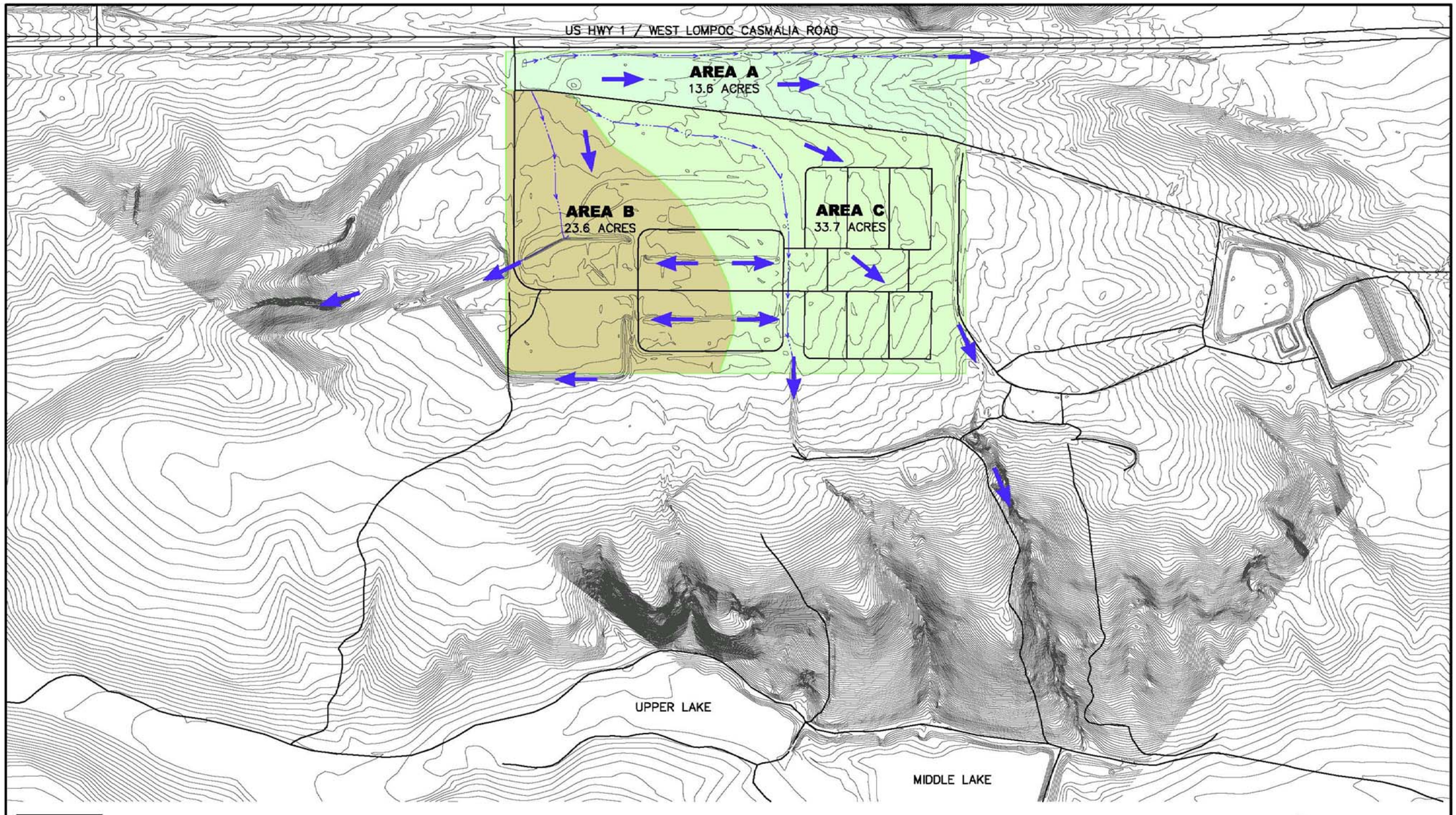
- VISITOR CENTER & CONFERENCE CENTER TRAFFIC
- VISITOR CENTER & CONFERENCE CENTER TRAFFIC (ALTERNATE)
- ADULT EDUCATION TRAFFIC
- MISSION SUPPORT CENTER TRAFFIC
- YOUTH EDUCATION TRAFFIC
- EMERGENCY & SERVICE ACCESS
- VISITOR CENTER PEDESTRIAN CIRCULATION
- ADULT EDUCATION & CONFERENCE CENTER PEDESTRIAN CIRCULATION
- YOUTH EDUCATION PEDESTRIAN CIRCULATION
- MISSION SUPPORT PEDESTRIAN

CALIFORNIA SPACE CENTER CONCEPTUAL MASTER PLAN

SCALE: 1" = 80'-0"

CALIFORNIA SPACE CENTER

WESTBERG + WHITE
ARCHITECTS AND PLANNERS



Penfield & Smith
Engineering · Surveying · Planning
· Construction Management ·
210 Enos Drive, Suite A, Santa Maria, CA 93454
Phone: (805) 925-2345 Fax: (805) 925-1539

EXHIBIT ONE
PRE-DEVELOPMENT DRAINAGE
CALIFORNIA SPACE CENTER PRELIMINARY DRAINAGE STUDY
OCTOBER 2008

EXISTING ROAD
TIME OF CONCENTRATION FLOW PATH
DIRECTION OF DRAINAGE

SCALE: 1"=400'
0 400 800 1200

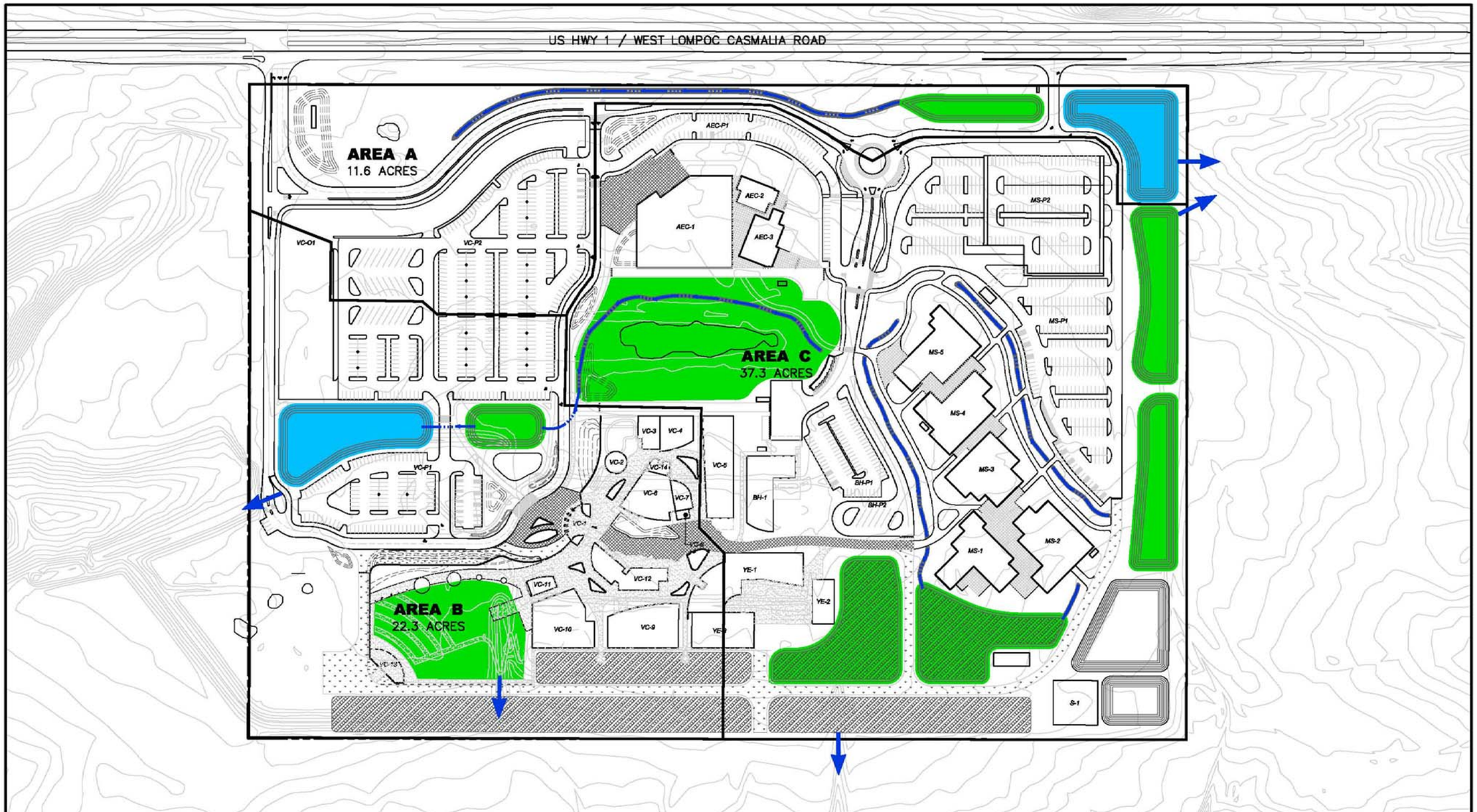


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EXHIBIT TWO
POST-DEVELOPMENT DRAINAGE

CALIFORNIA SPACE CENTER PRELIMINARY DRAINAGE STUDY
JUNE 2009

SHALLOW BASIN
FENCED BASIN
POTENTIAL SWALE LOCATION
DRAINAGE AREA BOUNDARY

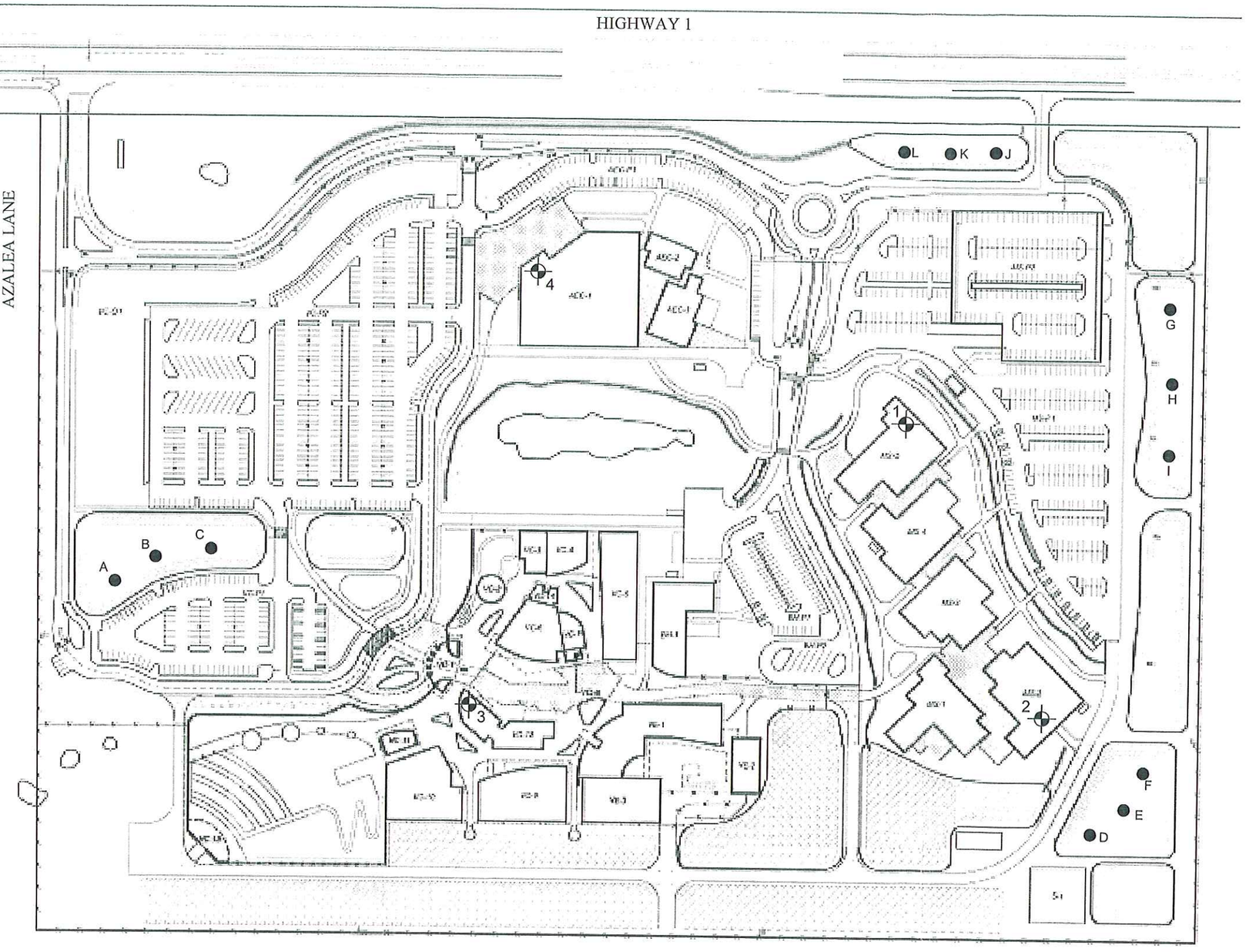
SCALE: 1"=200'
0 200 400 600

LEGEND

4 — 25 to 50' Deep Soil Sampling Borings

L — 5 to 15' Deep Percolation Test Borings

NOT TO SCALE



BORING AND PERCOLATION TEST LOCATION MAP

CALIFORNIA SPACE CENTER

South of Highway 1 and Azalea Lane
Vandenberg Air Force Base, California

Earth Systems Pacific

2049 North Preisker Lane, Suite E
Santa Maria, California 93454
(805) 928-2991 • FAX (805) 928-9253
E-mail: esc@earthsys.com

November 11, 2009 SMK SL-16108-SA

CALIFORNIA SPACE CENTER B&PTLM–111109.dwg

APPENDIX B:

Air Quality Analysis

California Space Center
Summary of Construction Emissions by Phase

	Emissions (lbs/day)						Emissions (Total Tons)					
	CO	VOC	NOx	SOx	PM_{10}	$PM_{2.5}$	CO	VOC	NOx	SOx	PM_{10}	$PM_{2.5}$
Phase 0												
Heavy Equipment	88.70	24.95	213.79	0.21	10.26	9.13	1.00	0.30	2.69	0.00	0.12	0.11
Construction Truck Trips	3.65	0.71	12.74	0.01	0.47	0.46	0.46	0.09	1.59	0.00	0.06	0.06
Worker Trips	27.98	1.58	2.94	0.02	0.15	0.15	3.50	0.20	0.37	0.00	0.02	0.02
Fugitive Dust					81.57	17.13					1.36	0.29
Subtotal	***120.33***	***27.24***	***229.47***	***0.25***	***92.45***	***26.88***	***4.96***	***0.58***	***4.65***	***0.01***	***1.56***	***0.47***
Phase 1												
Heavy Equipment	55.31	15.90	135.71	0.14	6.50	5.79	0.67	0.19	1.78	0.00	0.08	0.07
Construction Truck Trips	3.65	0.71	12.74	0.01	0.47	0.46	0.46	0.09	1.59	0.00	0.06	0.06
Worker Trips	27.98	1.58	2.94	0.02	0.15	0.15	3.50	0.20	0.37	0.00	0.02	0.02
Subtotal	***86.94***	***18.19***	***151.39***	***0.17***	***7.12***	***6.40***	***4.62***	***0.48***	***3.74***	***0.01***	***0.16***	***0.15***
Phase 2												
Heavy Equipment	88.44	23.19	194.58	0.24	8.79	7.82	1.52	0.43	3.74	0.00	0.15	0.13
Construction Truck Trips	2.70	0.55	8.96	0.01	0.34	0.34	0.34	0.07	1.12	0.00	0.04	0.04
Worker Trips	22.83	1.33	2.38	0.02	0.15	0.15	2.85	0.17	0.30	0.00	0.02	0.02
Subtotal	***113.97***	***25.08***	***205.91***	***0.27***	***9.28***	***8.31***	***4.71***	***0.66***	***5.16***	***0.01***	***0.21***	***0.19***
Phase 3												
Heavy Equipment	59.34	13.90	103.33	0.18	4.70	4.19	0.27	0.07	0.50	0.00	0.02	0.02
Construction Truck Trips	1.55	0.35	4.45	0.01	0.19	0.19	0.19	0.04	0.56	0.00	0.02	0.02
Worker Trips	13.64	0.85	1.40	0.02	0.15	0.15	1.71	0.11	0.17	0.00	0.02	0.02
Subtotal	***74.53***	***15.09***	***109.18***	***0.21***	***5.05***	***4.52***	***2.17***	***0.22***	***1.23***	***0.01***	***0.06***	***0.06***

California Space Center - Fugitive Dust Emissions

Construction Phase	Demolition Debris (ft^3)	Emission Factors (lbs/ft^3)	Emissions (Tons PM_{10})	Emissions (Tons $PM_{2.5}$)
Demolition of existing infrastructure (assume 10% of site)	3,092,760	0.000420	0.649480	0.136391

Grading	Total Acres	Emission Factor (lbs/acre-day)	Emissions (Tons PM_{10})	Emissions (Tons $PM_{2.5}$)
Total Acres	71	20	0.71	0.1491

Emission Factors: SCAQMD CEQA Air Quality Handbook, Appendix A; URBEMIS Model, Grading Emission factor (default)

California Space Center - Construction Emissions Calculation: Off-Road Equipment
Year 2009
Emission Factors

Equipment	Fuel	HP	Emission Factors (lb/hr)								No. of Equip	Hrs of Use
			CO	VOC	NOx	SOx	PM10	CO2	CH4	N2O		
Phase 0												
Road Reclaimer CAT RM 350-B	DIESEL	350	1.52	0.37	3.42	0.00	0.14	321.43	0.03	0.33	1	16
Excavator CAT 330-B	DIESEL	268	0.62	0.20	1.93	0.00	0.07	233.74	0.02	0.18	1	300
Loader CAT 966 G	DIESEL	262	0.76	0.22	2.17	0.00	0.08	237.01	0.02	0.21	1	180
Skid Steer CAT 236	DIESEL	71	0.28	0.06	0.41	0.00	0.04	42.76	0.01	0.04	1	200
Water Truck	DIESEL	189	0.43	0.16	1.61	0.00	0.06	166.55	0.01	0.15	1	650
Scraper CAT 623F	DIESEL	246	0.74	0.26	2.48	0.00	0.10	209.47	0.02	0.24	1	400
Scraper CAT 637 E	DIESEL	345	1.52	0.37	3.42	0.00	0.14	321.43	0.03	0.33	1	0
Compactor CAT 815F	DIESEL	232	0.45	0.15	1.62	0.00	0.06	153.09	0.01	0.15	1	0
Compactor CAT 825G	DIESEL	354	0.78	0.20	2.09	0.00	0.08	219.10	0.02	0.20	1	0
Motor Grader CAT 140 H	DIESEL	183	0.49	0.18	1.79	0.00	0.07	172.11	0.02	0.17	1	150
Disc CAT Challenger 45	DIESEL	50	0.29	0.10	0.28	0.00	0.03	27.99	0.01	0.03	1	12
Backhoe CAT 416C	DIESEL	76	0.36	0.09	0.57	0.00	0.05	51.73	0.01	0.05	1	234
IT Loader CAT IT28G	DIESEL	108	0.36	0.09	0.57	0.00	0.05	51.73	0.01	0.05	1	234
Base Roller CAT 563C	DIESEL	130	0.63	0.15	1.20	0.00	0.07	108.15	0.01	0.11	1	336
Skip & Drag John Deere 210C	DIESEL	313	1.52	0.37	3.42	0.00	0.14	321.43	0.03	0.33	1	200
Scraper CAT 613C	DIESEL	135	0.93	0.24	1.83	0.00	0.11	148.07	0.02	0.17	1	100
Paver CAT AP-1055B	DIESEL	224	0.70	0.24	2.33	0.00	0.10	194.37	0.02	0.22	1	90
Roller CAT CB-634C	DIESEL	137	0.63	0.15	1.20	0.00	0.07	108.15	0.01	0.11	1	90
Roller CAT CB-434C	DIESEL	83	0.42	0.12	0.74	0.00	0.06	58.99	0.01	0.07	1	90
C&G Machine Power Curb 5700-C	DIESEL	104	0.41	0.13	0.76	0.00	0.07	54.50	0.01	0.07	1	44
Phase 1												
Road Reclaimer CAT RM 350-B	DIESEL	350	1.52	0.37	3.42	0.00	0.14	321.43	0.03	0.33	1	0
Excavator CAT 330-B	DIESEL	268	0.62	0.20	1.93	0.00	0.07	233.74	0.02	0.18	1	332
Loader CAT 966 G	DIESEL	262	0.76	0.22	2.17	0.00	0.08	237.01	0.02	0.21	1	100
Skid Steer CAT 236	DIESEL	71	0.28	0.06	0.41	0.00	0.04	42.76	0.01	0.04	1	80
Water Truck	DIESEL	189	0.43	0.16	1.61	0.00	0.06	166.55	0.01	0.15	1	398
Scraper CAT 623F	DIESEL	246	0.74	0.26	2.48	0.00	0.10	209.47	0.02	0.24	1	0
Scraper CAT 637 E	DIESEL	345	1.52	0.37	3.42	0.00	0.14	321.43	0.03	0.33	1	0
Compactor CAT 815F	DIESEL	232	0.45	0.15	1.62	0.00	0.06	153.09	0.01	0.15	1	80
Compactor CAT 825G	DIESEL	354	0.78	0.20	2.09	0.00	0.08	219.10	0.02	0.20	1	0
Motor Grader CAT 140 H	DIESEL	183	0.49	0.18	1.79	0.00	0.07	172.11	0.02	0.17	1	266
Disc CAT Challenger 45	DIESEL	50	0.29	0.10	0.28	0.00	0.03	27.99	0.01	0.03	1	12
Backhoe CAT 416C	DIESEL	76	0.36	0.09	0.57	0.00	0.05	51.73	0.01	0.05	1	235
IT Loader CAT IT28G	DIESEL	108	0.36	0.09	0.57	0.00	0.05	51.73	0.01	0.05	1	235
Base Roller CAT 563C	DIESEL	130	0.63	0.15	1.20	0.00	0.07	108.15	0.01	0.11	1	0
Skip & Drag John Deere 210C	DIESEL	313	1.52	0.37	3.42	0.00	0.14	321.43	0.03	0.33	1	290
Scraper CAT 613C	DIESEL	135	0.93	0.24	1.83	0.00	0.11	148.07	0.02	0.17	1	68
Paver CAT AP-1055B	DIESEL	224	0.70	0.24	2.33	0.00	0.10	194.37	0.02	0.22	1	0
Roller CAT CB-634C	DIESEL	137	0.63	0.15	1.20	0.00	0.07	108.15	0.01	0.11	1	0
Roller CAT CB-434C	DIESEL	83	0.42	0.12	0.74	0.00	0.06	58.99	0.01	0.07	1	0
C&G Machine Power Curb 5700-C	DIESEL	104	0.41	0.13	0.76	0.00	0.07	54.50	0.01	0.07	1	44

Equipment	Fuel	HP	Emission Factors (lb/hr)								No. of Equip	Hrs of Use
			CO	VOC	NOx	SOx	PM10	CO2	CH4	N2O		
Phase 2												
Road Reclaimer CAT RM 350-B	DIESEL	350	1.21	0.32	2.83	0.00	0.11	321.43	0.03	0.27	1	40
Excavator CAT 330-B	DIESEL	268	0.53	0.17	1.48	0.00	0.05	233.74	0.02	0.14	1	512
Loader CAT 966 G	DIESEL	262	0.64	0.19	1.72	0.00	0.06	237.01	0.02	0.16	1	160
Skid Steer CAT 236	DIESEL	71	0.27	0.04	0.33	0.00	0.02	42.76	0.00	0.03	1	160
Water Truck	DIESEL	189	0.38	0.14	1.24	0.00	0.04	166.55	0.01	0.12	1	960
Scraper CAT 623F	DIESEL	246	0.64	0.23	2.05	0.00	0.08	209.47	0.02	0.19	1	0
Scraper CAT 637 E	DIESEL	345	1.21	0.32	2.83	0.00	0.11	321.43	0.03	0.27	1	912
Compactor CAT 815F	DIESEL	232	0.39	0.13	1.31	0.00	0.05	153.09	0.01	0.12	1	0
Compactor CAT 825G	DIESEL	354	0.63	0.17	1.68	0.00	0.06	219.10	0.01	0.16	1	304
Motor Grader CAT 140 H	DIESEL	183	0.43	0.15	1.42	0.00	0.05	172.11	0.01	0.13	1	448
Disc CAT Challenger 45	DIESEL	50	0.27	0.08	0.26	0.00	0.02	27.99	0.01	0.02	1	40
Backhoe CAT 416C	DIESEL	76	0.35	0.07	0.46	0.00	0.04	51.73	0.01	0.04	1	235
IT Loader CAT IT28G	DIESEL	108	0.35	0.07	0.46	0.00	0.04	51.73	0.01	0.04	1	235
Base Roller CAT 563C	DIESEL	130	0.62	0.12	1.01	0.00	0.06	108.15	0.01	0.10	1	144
Skip & Drag John Deere 210C	DIESEL	313	1.21	0.32	2.83	0.00	0.11	321.43	0.03	0.27	1	200
Scraper CAT 613C	DIESEL	135	0.91	0.21	1.56	0.00	0.09	148.07	0.02	0.15	1	72
Paver CAT AP-1055B	DIESEL	224	0.61	0.21	1.95	0.00	0.08	194.37	0.02	0.18	1	80
Roller CAT CB-634C	DIESEL	137	0.62	0.12	1.01	0.00	0.06	108.15	0.01	0.10	1	80
Roller CAT CB-434C	DIESEL	83	0.41	0.10	0.63	0.00	0.05	58.99	0.01	0.06	1	80
C&G Machine Power Curb 5700-C	DIESEL	104	0.40	0.11	0.66	0.00	0.06	54.50	0.01	0.06	1	48
Phase 3												
Road Reclaimer CAT RM 350-B	DIESEL	350	0.96	0.26	2.04	0.00	0.08	321.43	0.02	0.19	1	0
Excavator CAT 330-B	DIESEL	268	0.48	0.14	0.90	0.00	0.03	233.74	0.01	0.09	1	112
Loader CAT 966 G	DIESEL	262	0.54	0.15	1.13	0.00	0.04	237.01	0.01	0.11	1	0
Skid Steer CAT 236	DIESEL	71	0.27	0.03	0.22	0.00	0.01	42.76	0.00	0.02	1	0
Water Truck	DIESEL	189	0.36	0.11	0.76	0.00	0.03	166.55	0.01	0.07	1	320
Scraper CAT 623F	DIESEL	246	0.55	0.18	1.48	0.00	0.06	209.47	0.02	0.14	1	192
Scraper CAT 637 E	DIESEL	345	0.96	0.26	2.04	0.00	0.08	321.43	0.02	0.19	1	0
Compactor CAT 815F	DIESEL	232	0.34	0.10	0.90	0.00	0.03	153.09	0.01	0.09	1	64
Compactor CAT 825G	DIESEL	354	0.51	0.13	1.15	0.00	0.04	219.10	0.01	0.11	1	0
Motor Grader CAT 140 H	DIESEL	183	0.38	0.12	0.94	0.00	0.03	172.11	0.01	0.09	1	64
Disc CAT Challenger 45	DIESEL	50	0.24	0.05	0.22	0.00	0.01	27.99	0.00	0.02	1	16
Backhoe CAT 416C	DIESEL	76	0.34	0.05	0.32	0.00	0.02	51.73	0.00	0.03	1	224
IT Loader CAT IT28G	DIESEL	108	0.34	0.05	0.32	0.00	0.02	51.73	0.00	0.03	1	224
Base Roller CAT 563C	DIESEL	130	0.61	0.10	0.72	0.00	0.04	108.15	0.01	0.07	1	32
Skip & Drag John Deere 210C	DIESEL	313	0.96	0.26	2.04	0.00	0.08	321.43	0.02	0.19	1	18
Scraper CAT 613C	DIESEL	135	0.90	0.17	1.16	0.00	0.07	148.07	0.02	0.11	1	16
Paver CAT AP-1055B	DIESEL	224	0.52	0.17	1.43	0.00	0.05	194.37	0.02	0.14	1	10
Roller CAT CB-634C	DIESEL	137	0.61	0.10	0.72	0.00	0.04	108.15	0.01	0.07	1	10
Roller CAT CB-434C	DIESEL	83	0.39	0.07	0.47	0.00	0.04	58.99	0.01	0.05	1	10
C&G Machine Power Curb 5700-C	DIESEL	104	0.38	0.09	0.52	0.00	0.04	54.50	0.01	0.05	1	8

California Space Center - Construction Emissions Calculation: Off-Road equipment
Year 2009
Equipment Emissions

Equipment	Fuel	HP	Total Emissions (Tons)								
			CO	VOC	NOx	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Phase 0											
Road Reclaimer CAT RM 350-B	DIESEL	350	0.01	0.00	0.03	0.00	0.00	0.00	2.57	0.00	0.00
Excavator CAT 330-B	DIESEL	268	0.09	0.03	0.29	0.00	0.01	0.01	35.06	0.00	0.03
Loader CAT 966 G	DIESEL	262	0.07	0.02	0.20	0.00	0.01	0.01	21.33	0.00	0.02
Skid Steer CAT 236	DIESEL	71	0.03	0.01	0.04	0.00	0.00	0.00	4.28	0.00	0.00
Water Truck	DIESEL	189	0.14	0.05	0.52	0.00	0.02	0.02	54.13	0.00	0.05
Scraper CAT 623F	DIESEL	246	0.15	0.05	0.50	0.00	0.02	0.02	41.89	0.00	0.05
Scraper CAT 637 E	DIESEL	345	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor CAT 815F	DIESEL	232	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor CAT 825G	DIESEL	354	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motor Grader CAT 140 H	DIESEL	183	0.04	0.01	0.13	0.00	0.00	0.00	12.91	0.00	0.01
Disc CAT Challenger 45	DIESEL	50	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00
Backhoe CAT 416C	DIESEL	76	0.04	0.01	0.07	0.00	0.01	0.01	6.05	0.00	0.01
IT Loader CAT IT28G	DIESEL	108	0.04	0.01	0.07	0.00	0.01	0.01	6.05	0.00	0.01
Base Roller CAT 563C	DIESEL	130	0.11	0.02	0.20	0.00	0.01	0.01	18.17	0.00	0.02
Skip & Drag John Deere 210C	DIESEL	313	0.15	0.04	0.34	0.00	0.01	0.01	32.14	0.00	0.03
Scraper CAT 613C	DIESEL	135	0.05	0.01	0.09	0.00	0.01	0.00	7.40	0.00	0.01
Paver CAT AP-1055B	DIESEL	224	0.03	0.01	0.11	0.00	0.00	0.00	8.75	0.00	0.01
Roller CAT CB-634C	DIESEL	137	0.03	0.01	0.05	0.00	0.00	0.00	4.87	0.00	0.01
Roller CAT CB-434C	DIESEL	83	0.02	0.01	0.03	0.00	0.00	0.00	2.65	0.00	0.00
C&G Machine Power Curb 5700-C	DIESEL	104	0.01	0.00	0.02	0.00	0.00	0.00	1.20	0.00	0.00
Total			***1.00***	***0.30***	***2.69***	***0.00***	***0.12***	***0.11***	***259.62***	***0.03***	***0.26***
Phase 1											
Road Reclaimer CAT RM 350-B	DIESEL	350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator CAT 330-B	DIESEL	268	0.10	0.03	0.32	0.00	0.01	0.01	38.80	0.00	0.03
Loader CAT 966 G	DIESEL	262	0.04	0.01	0.11	0.00	0.00	0.00	11.85	0.00	0.01
Skid Steer CAT 236	DIESEL	71	0.01	0.00	0.02	0.00	0.00	0.00	1.71	0.00	0.00
Water Truck	DIESEL	189	0.09	0.03	0.32	0.00	0.01	0.01	33.14	0.00	0.03
Scraper CAT 623F	DIESEL	246	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scraper CAT 637 E	DIESEL	345	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor CAT 815F	DIESEL	232	0.02	0.01	0.06	0.00	0.00	0.00	6.12	0.00	0.01
Compactor CAT 825G	DIESEL	354	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motor Grader CAT 140 H	DIESEL	183	0.07	0.02	0.24	0.00	0.01	0.01	22.89	0.00	0.02
Disc CAT Challenger 45	DIESEL	50	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00
Backhoe CAT 416C	DIESEL	76	0.04	0.01	0.07	0.00	0.01	0.01	6.08	0.00	0.01
IT Loader CAT IT28G	DIESEL	108	0.04	0.01	0.07	0.00	0.01	0.01	6.08	0.00	0.01
Base Roller CAT 563C	DIESEL	130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Skip & Drag John Deere 210C	DIESEL	313	0.22	0.05	0.50	0.00	0.02	0.02	46.61	0.00	0.05
Scraper CAT 613C	DIESEL	135	0.03	0.01	0.06	0.00	0.00	0.00	5.03	0.00	0.01
Paver CAT AP-1055B	DIESEL	224	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller CAT CB-634C	DIESEL	137	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller CAT CB-434C	DIESEL	83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C&G Machine Power Curb 5700-C	DIESEL	104	0.01	0.00	0.02	0.00	0.00	0.00	1.20	0.00	0.00
Total			***0.67***	***0.19***	***1.78***	***0.00***	***0.08***	***0.07***	***180***	***0.02***	***0.17***

California Space Center Construction Emissions Calculation: Off-Road equipment
Year 2009
Equipment Emissions

Equipment	Fuel	HP	Total Emissions (Tons)								
			CO	VOC	NOx	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Phase 2											
Road Reclaimer CAT RM 350-B	DIESEL	350	0.02	0.01	0.06	0.00	0.00	0.00	6.43	0.00	0.01
Excavator CAT 330-B	DIESEL	268	0.13	0.04	0.38	0.00	0.01	0.01	59.84	0.00	0.04
Loader CAT 966 G	DIESEL	262	0.05	0.01	0.14	0.00	0.00	0.00	18.96	0.00	0.01
Skid Steer CAT 236	DIESEL	71	0.02	0.00	0.03	0.00	0.00	0.00	3.42	0.00	0.00
Water Truck	DIESEL	189	0.18	0.07	0.59	0.00	0.02	0.02	79.94	0.01	0.06
Scraper CAT 623F	DIESEL	246	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scraper CAT 637 E	DIESEL	345	0.55	0.15	1.29	0.00	0.05	0.04	146.57	0.01	0.12
Compactor CAT 815F	DIESEL	232	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor CAT 825G	DIESEL	354	0.10	0.03	0.26	0.00	0.01	0.01	33.30	0.00	0.02
Motor Grader CAT 140 H	DIESEL	183	0.10	0.03	0.32	0.00	0.01	0.01	38.55	0.00	0.03
Disc CAT Challenger 45	DIESEL	50	0.01	0.00	0.01	0.00	0.00	0.00	0.56	0.00	0.00
Backhoe CAT 416C	DIESEL	76	0.04	0.01	0.05	0.00	0.00	0.00	6.08	0.00	0.01
IT Loader CAT IT28G	DIESEL	108	0.04	0.01	0.05	0.00	0.00	0.00	6.08	0.00	0.01
Base Roller CAT 563C	DIESEL	130	0.04	0.01	0.07	0.00	0.00	0.00	7.79	0.00	0.01
Skip & Drag John Deere 210C	DIESEL	313	0.12	0.03	0.28	0.00	0.01	0.01	32.14	0.00	0.03
Scraper CAT 613C	DIESEL	135	0.03	0.01	0.06	0.00	0.00	0.00	5.33	0.00	0.01
Paver CAT AP-1055B	DIESEL	224	0.02	0.01	0.08	0.00	0.00	0.00	7.77	0.00	0.01
Roller CAT CB-634C	DIESEL	137	0.02	0.00	0.04	0.00	0.00	0.00	4.33	0.00	0.00
Roller CAT CB-434C	DIESEL	83	0.02	0.00	0.03	0.00	0.00	0.00	2.36	0.00	0.00
C&G Machine Power Curb 5700-C	DIESEL	104	0.01	0.00	0.02	0.00	0.00	0.00	1.31	0.00	0.00
Total			***1.52***	***0.43***	***3.74***	***0.00***	***0.15***	***0.13***	***461***	***0.04***	***0.36***
Phase 3											
Road Reclaimer CAT RM 350-B	DIESEL	350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator CAT 330-B	DIESEL	268	0.03	0.01	0.05	0.00	0.00	0.00	13.09	0.00	0.00
Loader CAT 966 G	DIESEL	262	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Skid Steer CAT 236	DIESEL	71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	DIESEL	189	0.06	0.02	0.12	0.00	0.00	0.00	26.65	0.00	0.01
Scraper CAT 623F	DIESEL	246	0.05	0.02	0.14	0.00	0.01	0.00	20.11	0.00	0.01
Scraper CAT 637 E	DIESEL	345	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor CAT 815F	DIESEL	232	0.01	0.00	0.03	0.00	0.00	0.00	4.90	0.00	0.00
Compactor CAT 825G	DIESEL	354	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motor Grader CAT 140 H	DIESEL	183	0.01	0.00	0.03	0.00	0.00	0.00	5.51	0.00	0.00
Disc CAT Challenger 45	DIESEL	50	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00
Backhoe CAT 416C	DIESEL	76	0.04	0.01	0.04	0.00	0.00	0.00	5.79	0.00	0.00
IT Loader CAT IT28G	DIESEL	108	0.04	0.01	0.04	0.00	0.00	0.00	5.79	0.00	0.00
Base Roller CAT 563C	DIESEL	130	0.01	0.00	0.01	0.00	0.00	0.00	1.73	0.00	0.00
Skip & Drag John Deere 210C	DIESEL	313	0.01	0.00	0.02	0.00	0.00	0.00	2.89	0.00	0.00
Scraper CAT 613C	DIESEL	135	0.01	0.00	0.01	0.00	0.00	0.00	1.18	0.00	0.00
Paver CAT AP-1055B	DIESEL	224	0.00	0.00	0.01	0.00	0.00	0.00	0.97	0.00	0.00
Roller CAT CB-634C	DIESEL	137	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.00
Roller CAT CB-434C	DIESEL	83	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00
C&G Machine Power Curb 5700-C	DIESEL	104	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00
Total			***0.27***	***0.07***	***0.50***	***0.00***	***0.02***	***0.02***	***90***	***0.01***	***0.05***

California Space Center - Construction Truck Trips
Emission Factors

Construction Phase	Vehicle Class	Workers per Phase	Speed (mph)	VMT (mi/veh-day)	CO	NO_X	VOCs	SOx	PM_{10}			CO_2	CH_4	N_2O
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)
2010	Heavy-Duty Truck	5	15	80	4.14	14.45	0.81	0.02	0.47	0.04	0.03	1,827.81	0.04	1.37
2011	Heavy-Duty Truck	5	15	80	3.77	12.99	0.75	0.02	0.42	0.04	0.03	1,827.81	0.04	1.23
2012	Heavy-Duty Truck	5	15	80	3.41	11.55	0.69	0.02	0.37	0.04	0.03	1,827.81	0.03	1.10
2013	Heavy-Duty Truck	5	15	80	3.06	10.16	0.63	0.02	0.32	0.04	0.03	1,827.81	0.03	0.97
2014	Heavy-Duty Truck	5	15	80	2.74	8.90	0.57	0.02	0.28	0.04	0.03	1,827.81	0.03	0.85
2015	Heavy-Duty Truck	5	15	80	2.47	7.85	0.53	0.02	0.25	0.04	0.03	1,827.81	0.02	0.75
2016	Heavy-Duty Truck	5	15	80	2.25	6.98	0.49	0.02	0.22	0.04	0.03	1,827.81	0.02	0.66
2017	Heavy-Duty Truck	5	15	80	2.06	6.23	0.45	0.02	0.19	0.04	0.03	1,827.81	0.02	0.59
2018	Heavy-Duty Truck	5	15	80	1.90	5.59	0.42	0.02	0.17	0.04	0.03	1,827.81	0.02	0.53
2019	Heavy-Duty Truck	5	15	80	1.75	5.05	0.39	0.02	0.16	0.04	0.03	1,827.81	0.02	0.48

NOTES:

Assuming 40 miles round trip per vehicle
Assume startup after 8 hours
Assume 45 minutes run time total
Emission Factors from EMFAC2007, average temp 60F

California Space Center - Construction Truck Trips
Emissions

Construction Phase	Vehicle Class	Workers per Phase	Speed (mph)	VMT (mi/veh-day)	Emissions (lbs/day)								
					CO	NOx	VOCs	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
2010	Heavy-Duty Truck	5	15	80	3.65	12.74	0.71	0.01	0.47	0.46	1,611.86	0.03	1.21
2011	Heavy-Duty Truck	5	15	80	3.33	11.45	0.66	0.01	0.42	0.42	1,611.86	0.03	1.09
2012	Heavy-Duty Truck	5	15	80	3.01	10.18	0.61	0.01	0.38	0.38	1,611.86	0.03	0.97
2013	Heavy-Duty Truck	5	15	80	2.70	8.96	0.55	0.01	0.34	0.34	1,611.86	0.03	0.85
2014	Heavy-Duty Truck	5	15	80	2.42	7.85	0.50	0.01	0.30	0.30	1,611.86	0.02	0.75
2015	Heavy-Duty Truck	5	15	80	2.18	6.92	0.46	0.01	0.27	0.27	1,611.86	0.02	0.66
2016	Heavy-Duty Truck	5	15	80	1.99	6.15	0.43	0.01	0.25	0.25	1,611.86	0.02	0.58
2017	Heavy-Duty Truck	5	15	80	1.82	5.49	0.40	0.01	0.23	0.22	1,611.86	0.02	0.52
2018	Heavy-Duty Truck	5	15	80	1.67	4.93	0.37	0.01	0.21	0.21	1,611.86	0.02	0.47
2019	Heavy-Duty Truck	5	15	80	1.55	4.45	0.35	0.01	0.19	0.19	1,611.86	0.02	0.42
Total					***24.31***	***79.13***	***5.04***	***0.15***	***3.06***	***3.03***	***16,118.59***	***0.23***	***7.52***

Construction Phase	Vehicle Class	Workers per Phase	Speed (mph)	VMT (mi/veh-day)	Days	Emissions (tons/year)								
						CO	NOx	VOCs	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
2010	Heavy-Duty Truck	5	15	80	250	0.46	1.59	0.09	0.00	0.06	0.06	201.48	0.00	0.15
2011	Heavy-Duty Truck	5	15	80	250	0.42	1.43	0.08	0.00	0.05	0.05	201.48	0.00	0.14
2012	Heavy-Duty Truck	5	15	80	250	0.38	1.27	0.08	0.00	0.05	0.05	201.48	0.00	0.12
2013	Heavy-Duty Truck	5	15	80	250	0.34	1.12	0.07	0.00	0.04	0.04	201.48	0.00	0.11
2014	Heavy-Duty Truck	5	15	80	250	0.30	0.98	0.06	0.00	0.04	0.04	201.48	0.00	0.09
2015	Heavy-Duty Truck	5	15	80	250	0.27	0.86	0.06	0.00	0.03	0.03	201.48	0.00	0.08
2016	Heavy-Duty Truck	5	15	80	250	0.25	0.77	0.05	0.00	0.03	0.03	201.48	0.00	0.07
2017	Heavy-Duty Truck	5	15	80	250	0.23	0.69	0.05	0.00	0.03	0.03	201.48	0.00	0.07
2018	Heavy-Duty Truck	5	15	80	250	0.21	0.62	0.05	0.00	0.03	0.03	201.48	0.00	0.06
2019	Heavy-Duty Truck	5	15	80	250	0.19	0.56	0.04	0.00	0.02	0.02	201.48	0.00	0.05
Total						***3.04***	***9.89***	***0.63***	***0.02***	***0.38***	***0.38***	***2,014.82***	***0.03***	***0.94***

NOTES:

Assuming 40 miles round trip per vehicle
Assume startup after 8 hours
Assume 45 minutes run time total
Emission Factors from EMFAC2007, average temp 60F

California Space Center - Worker Trips
Emission Factors

Construction Phase	Vehicle Class	Workers per Phase	Speed (mph)	VMT (mi/veh-day)	CO		NOX	
					Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)
2010	Light-duty truck, catalyst	50	35	40	5.49	17.19	0.63	0.82
2011	Light-duty truck, catalyst	50	35	40	5.13	16.21	0.59	0.78
2012	Light-duty truck, catalyst	50	35	40	4.80	15.20	0.54	0.73
2013	Light-duty truck, catalyst	50	35	40	4.47	14.17	0.51	0.68
2014	Light-duty truck, catalyst	50	35	40	4.14	13.13	0.47	0.63
2015	Light-duty truck, catalyst	50	35	40	3.82	12.08	0.43	0.58
2016	Light-duty truck, catalyst	50	35	40	3.50	11.05	0.39	0.53
2017	Light-duty truck, catalyst	50	35	40	3.20	10.05	0.36	0.48
2018	Light-duty truck, catalyst	50	35	40	2.93	9.14	0.33	0.44
2019	Light-duty truck, catalyst	50	35	40	2.68	8.31	0.30	0.40

Construction Phase	Vehicle Class	Workers per Phase	Speed (mph)	VMT (mi/veh-day)	VOCs					
					Running Exhaust (g/mi)	Start-Up (g/start)	Hot-Soak (g/trip)	Resting Loss (g/hr)	Running Evap (g/mi)	Diurnal Evap (g/hr)
2010	Light-duty truck, catalyst	50	35	40	0.15	1.37	0.34	0.04	0.09	0.10
2011	Light-duty truck, catalyst	50	35	40	0.14	1.28	0.34	0.04	0.09	0.10
2012	Light-duty truck, catalyst	50	35	40	0.13	1.19	0.34	0.04	0.08	0.10
2013	Light-duty truck, catalyst	50	35	40	0.12	1.10	0.34	0.04	0.08	0.10
2014	Light-duty truck, catalyst	50	35	40	0.11	1.01	0.34	0.04	0.08	0.09
2015	Light-duty truck, catalyst	50	35	40	0.10	0.92	0.34	0.04	0.07	0.09
2016	Light-duty truck, catalyst	50	35	40	0.09	0.83	0.33	0.04	0.07	0.09
2017	Light-duty truck, catalyst	50	35	40	0.08	0.75	0.32	0.04	0.06	0.08
2018	Light-duty truck, catalyst	50	35	40	0.08	0.68	0.31	0.04	0.06	0.08
2019	Light-duty truck, catalyst	50	35	40	0.07	0.61	0.30	0.04	0.06	0.08

NOTES:

Assuming 40 miles round trip per vehicle

Assume startup after 8 hours

Assume 45 minutes run time total

Emission Factors from EMFAC2007, average temp 60F

California Space Center - Worker Trips
Emission Factors

Construction Phase	Vehicle Class	Workers per Phase	Speed (mph)	VMT (mi/veh-day)	SOx		PM_{10}			
					Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)	Tire Wear (g/mi)	Brake Wear (g/mi)
2010	Light-duty truck, catalyst	50	35	40	0.00	0.00	0.01	0.02	0.01	0.01
2011	Light-duty truck, catalyst	50	35	40	0.00	0.00	0.01	0.02	0.01	0.01
2012	Light-duty truck, catalyst	50	35	40	0.00	0.00	0.01	0.02	0.01	0.01
2013	Light-duty truck, catalyst	50	35	40	0.00	0.00	0.01	0.02	0.01	0.01
2014	Light-duty truck, catalyst	50	35	40	0.00	0.00	0.01	0.02	0.01	0.01
2015	Light-duty truck, catalyst	50	35	40	0.00	0.00	0.01	0.02	0.01	0.01
2016	Light-duty truck, catalyst	50	35	40	0.00	0.00	0.01	0.02	0.01	0.01
2017	Light-duty truck, catalyst	50	35	40	0.00	0.00	0.01	0.02	0.01	0.01
2018	Light-duty truck, catalyst	50	35	40	0.00	0.00	0.01	0.02	0.01	0.01
2019	Light-duty truck, catalyst	50	35	40	0.00	0.00	0.01	0.02	0.01	0.01

Construction Phase	Vehicle Class	Workers per Phase	Speed (mph)	VMT (mi/veh-day)	CO_2		CH_4		N_2O	
					Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)
2010	Light-duty truck, catalyst	50	35	40	384.76	205.72	0.04	0.08	0.06	0.08
2011	Light-duty truck, catalyst	50	35	40	384.77	205.26	0.04	0.07	0.06	0.07
2012	Light-duty truck, catalyst	50	35	40	384.64	204.75	0.04	0.07	0.05	0.07
2013	Light-duty truck, catalyst	50	35	40	384.48	204.24	0.04	0.06	0.05	0.06
2014	Light-duty truck, catalyst	50	35	40	384.29	203.71	0.03	0.06	0.04	0.06
2015	Light-duty truck, catalyst	50	35	40	383.91	203.13	0.03	0.05	0.04	0.06
2016	Light-duty truck, catalyst	50	35	40	383.52	202.54	0.03	0.05	0.04	0.05
2017	Light-duty truck, catalyst	50	35	40	383.13	201.97	0.03	0.04	0.03	0.05
2018	Light-duty truck, catalyst	50	35	40	382.60	201.38	0.02	0.04	0.03	0.04
2019	Light-duty truck, catalyst	50	35	40	382.12	200.84	0.02	0.03	0.03	0.04

NOTES:

Assuming 40 miles round trip per vehicle

Assume startup after 8 hours

Assume 45 minutes run time total

Emission Factors from EMFAC2007, average temp 60F

California Space Center - Worker Trips
Emissions

Construction Phase	Vehicle Class	Workers per Phase	Speed (mph)	VMT (mi/veh-day)	Emissions (lbs/day)								
					CO	NOx	VOCs	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
2010	Light-duty truck, catalyst	50	35	40	27.98	2.94	1.58	0.02	0.15	0.15	1,741.88	0.21	0.28
2011	Light-duty truck, catalyst	50	35	40	26.21	2.75	1.50	0.02	0.15	0.15	1,741.82	0.20	0.26
2012	Light-duty truck, catalyst	50	35	40	24.52	2.56	1.42	0.02	0.15	0.15	1,741.13	0.18	0.24
2013	Light-duty truck, catalyst	50	35	40	22.83	2.38	1.33	0.02	0.15	0.15	1,740.30	0.17	0.23
2014	Light-duty truck, catalyst	50	35	40	21.15	2.20	1.25	0.02	0.15	0.15	1,739.34	0.16	0.21
2015	Light-duty truck, catalyst	50	35	40	19.48	2.02	1.16	0.02	0.15	0.15	1,737.54	0.14	0.19
2016	Light-duty truck, catalyst	50	35	40	17.86	1.85	1.08	0.02	0.15	0.15	1,735.69	0.13	0.18
2017	Light-duty truck, catalyst	50	35	40	16.30	1.68	0.99	0.02	0.15	0.15	1,733.85	0.12	0.16
2018	Light-duty truck, catalyst	50	35	40	14.91	1.53	0.92	0.02	0.15	0.15	1,731.37	0.11	0.15
2019	Light-duty truck, catalyst	50	35	40	13.64	1.40	0.85	0.02	0.15	0.15	1,729.16	0.10	0.13
TOTAL					***27.98***	***2.94***	***1.58***	***0.02***	***0.15***	***0.15***	***1,741.88***	***0.21***	***0.28***

Construction Phase	Vehicle Class	Workers per Phase	Speed (mph)	VMT (mi/veh-day)	Days	Emissions (tons/year)								
						CO	NOx	VOCs	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
2010	Light-duty truck, catalyst	50	35	40	250	3.50	0.37	0.20	0.00	0.02	0.02	217.74	0.03	0.03
2011	Light-duty truck, catalyst	50	35	40	250	3.28	0.34	0.19	0.00	0.02	0.02	217.73	0.02	0.03
2012	Light-duty truck, catalyst	50	35	40	250	3.06	0.32	0.18	0.00	0.02	0.02	217.64	0.02	0.03
2013	Light-duty truck, catalyst	50	35	40	250	2.85	0.30	0.17	0.00	0.02	0.02	217.54	0.02	0.03
2014	Light-duty truck, catalyst	50	35	40	250	2.64	0.27	0.16	0.00	0.02	0.02	217.42	0.02	0.03
2015	Light-duty truck, catalyst	50	35	40	250	2.44	0.25	0.15	0.00	0.02	0.02	217.19	0.02	0.02
2016	Light-duty truck, catalyst	50	35	40	250	2.23	0.23	0.13	0.00	0.02	0.02	216.96	0.02	0.02
2017	Light-duty truck, catalyst	50	35	40	250	2.04	0.21	0.12	0.00	0.02	0.02	216.73	0.01	0.02
2018	Light-duty truck, catalyst	50	35	40	250	1.86	0.19	0.12	0.00	0.02	0.02	216.42	0.01	0.02
2019	Light-duty truck, catalyst	50	35	40	250	1.71	0.17	0.11	0.00	0.02	0.02	216.15	0.01	0.02
TOTAL						***3.50***	***0.37***	***0.20***	***0.00***	***0.02***	***0.02***	***217.74***	***0.03***	***0.03***

NOTES:

Assuming 40 miles round trip per vehicle

Assume startup after 8 hours

Assume 45 minutes run time total

Emission Factors from EMFAC2007, average temp 60F

California Space Center - Operational Vehicles
Emission Factors

Vehicle Trip Category	Vehicle Class	Vehicles per Year	Speed (mph)	VMT (mi/veh-day)	CO		NO_X	
					Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)
Visitor	All	500,000	35	20	3.399	15.132	0.703	1.049
Employee	All	428,250	35	20	3.399	15.132	0.703	1.049

Vehicle Trip Category	Vehicle Class	Vehicles per Year	Speed (mph)	VMT (mi/veh-day)	VOCs					
					Running Exhaust (g/mi)	Start-Up (g/start)	Hot-Soak (g/trip)	Resting Loss (g/hr)	Running Evap (g/mi)	Diurnal Evap (g/hr)
Visitor	All	500,000	35	20	0.142	1.279	0.233	0.031	0.054	0.069
Employee	All	428,250	35	20	0.142	1.279	0.233	0.031	0.054	0.069

Vehicle Trip Category	Vehicle Class	Vehicles per Year	Speed (mph)	VMT (mi/veh-day)	SOx		PM_{10}			
					Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)	Tire Wear (g/mi)	Brake Wear (g/mi)
Visitor	All	500,000	35	20	0.004	0.002	0.022	0.018	0.008	0.013
Employee	All	428,250	35	20	0.004	0.002	0.022	0.018	0.008	0.013

Vehicle Trip Category	Vehicle Class	Vehicles per Year	Speed (mph)	VMT (mi/veh-day)	CO_2		CH_4		N_2O	
					Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)
Visitor	All	500,000	35	20	401.699	194.549	0.03	0.073	0.066785	0.099655
Employee	All	428,250	35	20	401.699	194.549	0.03	0.073	0.066785	0.099655

NOTES:

Assuming 40 miles round trip per vehicle

Assume startup after 8 hours

Assume 45 minutes run time total

Emission Factors from EMFAC2007, average temp 60F

California Space Center - Operational Vehicles
Emissions

Vehicle Trip Category	Vehicle Class	Vehicles per Year	Speed (mph)	VMT (mi/veh-day)	Emissions (tons/year)								
					CO	NOx	VOCs	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Visitor	All	500,000	35	20	45.81	8.33	4.18	0.05	0.48	0.48	4,535.22	0.37	0.79
Employee	All	428,250	35	20	39.23	7.13	3.58	0.04	0.41	0.41	3,884.42	0.32	0.68
TOTAL					***85.04***	***15.46***	***7.76***	***0.08***	***0.90***	***0.89***	***8,419.64***	***0.69***	***1.47***

NOTES:

Assuming 40 miles round trip per vehicle

Assume startup after 8 hours

Assume 45 minutes run time total

Emission Factors from EMFAC2007, average temp 60F

California Space Center - Emergency Generators
Emission Factors

	Kilowatts	Horsepower	Emission Factors (lbs/hp-hr)					
			CO	ROC	NOx	SOx	PM_{10}	CO_2
Emergency Generator	500	670.5	0.00668	0.00251	0.03100	0.00205	0.00220	1.15000

California Space Center - Emergency Generators
Emissions

	Kilowatts	Horsepower	Emissions (lbs/hour)					
			CO	ROC	NOx	SOx	PM_{10}	CO_2
Emergency Generator	500	670.5	4.48	1.68	20.79	1.37	1.48	771.08
Total			***4.48***	***1.68***	***20.79***	***1.37***	***1.48***	***771.08***

	Kilowatts	Horsepower	Emissions (tons/year)					
			CO	ROC	NOx	SOx	PM_{10}	CO_2
Emergency Generator	500	670.5	0.12	0.04	0.54	0.04	0.04	20.05
Total			***0.12***	***0.04***	***0.54***	***0.04***	***0.04***	***20.05***

California Space Center - Boilers and Heaters
Emission Factors

Boiler	MMBTU/ hour	Emission Factors (lbs/MMBTU)							
		CO	ROC	NOx	SOx	PM_{10}	CO_2	CH_4	N_2O
Mission Support Complex - Phase I	4	0.08235	0.00539	0.04902	0.00059	0.00745	117.64706	0.00225	0.00063
Back of House - Phase II	1	0.08235	0.00539	0.04902	0.00059	0.00745	117.64706	0.00225	0.00063
Adult Education Center - Phase II	2.78	0.08235	0.00539	0.04902	0.00059	0.00745	117.64706	0.00225	0.00063
Visitors Center - Phase II	3.66	0.08235	0.00539	0.04902	0.00059	0.00745	117.64706	0.00225	0.00063
Youth Center - Phase III	2	0.08235	0.00539	0.04902	0.00059	0.00745	117.64706	0.00225	0.00063
Mission Support Complex - Phase III	2.04	0.08235	0.00539	0.04902	0.00059	0.00745	117.64706	0.00225	0.00063

California Space Center - Boilers and Heaters
Emissions

Boiler	MMBTU/ hour	Emissions (lbs/hour)							
		CO	ROC	NOx	SOx	PM10	CO2	CH4	N2O
Mission Support Phase I	4	0.33	0.02	0.20	0.00	0.03	470.59	0.01	0.00
Back of House Phase II	1	0.08	0.01	0.05	0.00	0.01	119.06	0.00	0.00
Adult Education Center Phase II	2.78	0.23	0.01	0.14	0.00	0.02	327.06	0.01	0.00
Visitors Center Phase II	3.66	0.30	0.02	0.18	0.00	0.03	430.59	0.01	0.00
Youth Center Phase III	2	0.16	0.01	0.10	0.00	0.01	235.29	0.00	0.00
Mission Support Phase III	2.04	0.17	0.01	0.10	0.00	0.02	240.00	0.00	0.00
Total		***1.28***	***0.08***	***0.76***	***0.01***	***0.12***	***1,822.59***	***0.03***	***0.01***

Boiler	MMBTU/ hour	Emissions (tons/year)							
		CO	ROC	NOx	SOx	PM10	CO2	CH4	N2O
Mission Support Phase I	4	0.0412	0.0027	0.0245	0.0003	0.0037	58.8235	0.0011	0.0003
Back of House Phase II	1	0.0104	0.0007	0.0062	0.0001	0.0009	14.8824	0.0003	0.0001
Adult Education Center Phase II	2.78	0.0286	0.0019	0.0170	0.0002	0.0026	40.8824	0.0008	0.0002
Visitors Center Phase II	3.66	0.0377	0.0025	0.0224	0.0003	0.0034	53.8235	0.0010	0.0003
Youth Center Phase III	2	0.0206	0.0013	0.0123	0.0001	0.0019	29.4118	0.0006	0.0002
Mission Support Phase III	2.04	0.0210	0.0014	0.0125	0.0002	0.0019	30.0000	0.0006	0.0002
Total		***0.1595***	***0.0104***	***0.0949***	***0.0011***	***0.0144***	***227.8235***	***0.0044***	***0.0012***

MMBTU = One thousand thousand British Thermal Units